PROCEEDINGS

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OF

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Meeting of November 2, 1911.

The 253d regular meeting of the Society was entertained by Professor A. L. Quaintance in the Saengerbund Hall on the night of November 2, 1911, with twenty-five members (Messrs. Babcock, Baker, Barber, Busck, Crawford, Cushman, Dyar, Ely, Foster, Gahan, Gill, Hammar, Howard, Jones, Knab, Myers, Popenoe, Quaintance, Russell, Sanford, Scott, Schwarz, Walton, Webb) and two guests (Siegler and Wood) present. First Vice President Quaintance occupied the chair. The minutes of the previous meeting were read and corrected. The report of the committee to prepare the Obituary and Bibliography of the late D. W. Coquillett was submitted and referred to the Publication Committee.*

Mr. Schwarz proposed the name of Dr. K. Escherich, of Tharandt, Germany, for corresponding membership, to be acted upon at the next meeting.

Mr. Gahan read the first paper of the program, "Descriptions of two new genera and six new species of parasitic Hymenoptera," which was followed by a short discussion on the confusion that has resulted from the publication of the supposed hosts of parasites.

*Already published, Proc. Ent. Soc. Wash., XIII, 198, 1911.

DESCRIPTIONS OF TWO NEW GENERA AND SIX NEW SPECIES OF PARASITIC HYMENOPTERA.*

BY A. B. GAHAN.

The descriptions of one new genus and three new species of Ichneumonoidea, one new genus and two new species of Chalcidoidea, and one new species of Proctotrypoidea are contained in this paper. Types of all will be deposited in the United States National Museum.

ICHNEUMONOIDEA.

BRACONIDÆ.

MICROGASTERINÆ.

Apanteles (Pseudapanteles) terminalis, new species.

1900. *Pseudapanteles terminalis* Ashm. MS. in Smith's Ins. N. J., 1899, p. 593.

Male.—Length 3.5 mm. Black, except legs and anal one-third of abdomen, which are brownish testaceous. Whole head, except occiput, strongly rugoso-punctate and covered with short whitish pubescence; mandibles blackish brown; eyes hairy; clypeal fovea deep and rounded; labrum conspicuous; palpi pale yellowish; scape brownish testaceous, the flagellum wholly black. Thorax rugoso-punctate with whitish pubescence, the posterior half of the mesopleuræ smooth, impunctate. Propodium wholly rugoso-punctate, with distinct median and lateral carinæ, the latero-posterior angles prominent, giving an appearance of concavity to the posterior face of the propodium. Anterior and median coxæ brownish, posterior pair black, all trochanters, femora, and tibiæ brownish testaceous, darkest above, all tarsi more or less dark brown, the two anterior pairs slightly testaceous. Wings hyaline, the costal, postmarginal, radius, first intracubital, apex of the median, and more or less of the discoidal veins and the stigma brownish; remainder of the venation paler. First dorsal tergite one and one-half times as long as wide, the sides parallel or nearly, second segment half the length of the first, the third still shorter. The first three dorsal segments are strongly rugoso-punctate, the first two entirely black and the third with a broad crescent-shaped black spot basally, its lateral angles and apex like the following segments and ventral surface testaceous.

Female.—Scape, pedicel, and three basal joints of the flagellum brownish testaceous; mandibles reddish brown; all coxæ as well as femoræ, tibiæ, and tarsi pale testaceous; wing veins and stigma brownish testaceous. Ovipositor exserted about the length of the abdomen. Otherwise like the male.

*Contribution from the Entomological Laboratory of the Maryland Agricultural Experiment Station.

Type: No. 12758, U. S. National Museum.

Described from seven specimens, as follows: Three males from Jacksonville, Florida; one male from Cedar Point, Maryland; one male and one female from Long Island, New York, and one male from College Park, Maryland. The College Park specimen is in the collection of the Maryland Experiment Station; all others are in the United States National Museum. The male and female from Long Island are undoubtedly the specimens selected by Dr. Ashmead as types for the species.

RHOGADINÆ.

ALLORHOGAS, new genus.

Transfacial line equaling or nearly the facial line. Head transverse, the temples rather broad, two-thirds the width of the eyes; antennæ long filiform; ocelli in a small equilateral triangle; labial palpi three-jointed, the maxillary palpi four-jointed. Head and thorax very finely reticulately sculptured; parapsidal furrows complete and deeply impressed, the median lobe of the mesocutum with a broad median longitudinal furrow; scutellum small; mesopleuræ with a distinct furrow; propodium more or less rugose, rather abruptly declivious posteriorly, with two distinct carinæ originating at the median point on the anterior margin and diverging in a curve posteriorly to the apex of the truncation, where they merge with the lateral longitudinal carinæ. Wings with three cubital cells; the marginal cell completely closed; the recurrent nervure interstitial with the first transverse cubital; radius arising from the middle of the stigma, its first abscissa very slightly shorter than the second, the latter about half the length of the second abscissa of cubitus. Abdomen oblong-ovate, sessile, slightly longer than the thorax; the first segment longer than wide, striate with two carinæ laterally at the base; second segment and apical half of the third strongly striate, the suture between distinct but not deeply impressed; ovipositor exserted about twice the length of the abdomen.

Type: Allorhogas gallicola, new species.

In Ashmead's "Classification of the Ichneumon Flies" this genus would fall near *Clinocentrus*. It may be distinguished from that genus by the non-compressed abdomen. From *Oncophanes* and *Epirhyssalus* it is separated by the fact that the abdominal segments are not tumid. In Szepligeti's classification of the Braconidæ the genus agrees most nearly with *Semirhytus*, but the thorax is not smooth, the parapsidal furrows are deeply impressed, and the recurrent nervure is interstitial. The latter character differentiates it from *Rhogas*.

Allorhogas gallicola, new species.

Female—Length 4 mm. Antennæ 30-jointed, the flagellum blackish brown, darkest apically, the basal joints and scape somewhat testaceous. Face more distinctly pilose than the rest of the head, its sculpture, except on the median line which is nearly smooth, slightly coarser and more distinctly punctate than the vertex; mouth opening rather small; eyes, mandibles at the apex, and spot enclosed by the ocelli black; remainder of head, thorax, and abdomen brownish-testaceous; the metathorax and propodium slightly darker than the rest of the body; scutellum small, separated from the mesoscutum by a deep, wide furrow which is broken by several transverse ridges; carinæ of the propodium with numerous short transverse striæ radiating from them. Palpi and legs slightly paler than the body, the hind tibiæ brownish and the apical joint of all tarsi brown. Wings hyaline; tegulæ and veins at base yellowish; stigma and veins outwardly brownish. Apical half of third abdominal segment and base of the fourth faintly lineolate, others smooth; ovipositor blackish.

Male.—Similar to the female in every respect except that the propodium is slightly more rugose and somewhat darker than in the female and the antennæ are 28-jointed.

Type: No. 14358, U. S. National Museum.

Described from a single female reared May 20, 1911, and two males reared April 27 and May 18, 1911, respectively, at College Park, Maryland, from cynipid twig-galls on *Quercus pinifolia.* From these same galls were reared specimens of *Synanthedon scitula* Harris, and it is reasonable to suppose that the braconid is parasitic on that moth. In the National Museum are two specimens, apparently the same species, bearing the number 2610^{o1} Ft. Grant, Arizona. The record to which this number refers shows that the specimens were bred from twig-galls of oak from the above-mentioned locality, and is interesting as indicating a wide distribution for the species.

ALYSIIDÆ.

DACNUSINÆ.

Synaldis incisa, new species.

Female.—Length 2 mm. Black; smooth and shining. Antennæ submoniliform, brownish-testaceous, darker toward the apex; first flagellar longer and more slender than the second, the second not twice as long as thick, following joints shortening and narrowing gradually toward the apex, about one and one-half times as long as wide, the joints toward the apex slightly pedicellate. Head smooth and shining; face somewhat pilose, with a faint median carina between

the antennæ: vertex divided by a deep median furrow extending from the ocelli to the occipital foramen. Mesothorax smooth, shining impunctate; the parapsidal furrows absent, the mesoscutum with a short median longitudinal furrow or incision near its posterior margin; mesopleuræ with a distinct furrow; propodium rugose with a short median carina anteriorly becoming lost in the roughness of the sculpture posteriorly. Wings hyaline; the stigma very narrow, only slightly thicker than the postmarginal vein, which is thickened throughout its whole length; the first cubital cross-vein is entirely absent, the second removed nearly one-third the length of the radius from the origin of the latter; the cubital nervure abruptly cut off just beyond the cross-vein; marginal cell reaching to the apex of the wing; costal, radial and postmarginal veins and the stigma brownish, remainder of the neuration pale. Palpi and legs brownish-testaceous, darkest above. Abdomen not longer than the head and thorax, smooth, shining, black; ovipositor exserted half the length of the abdomen, brownish-testaceous.

Habitat: Manhattan, Kansas.

Type: No. 14357, U. S. National Museum.

Two slides bearing a large number of specimens were received from T. J. Headlee for identification. These specimens were taken from cages in which the Hessian fly was breeding and are possibly parasitic on that insect.

The species may be distinguished from *S. ulmicola* Ashm. by the incision on the mesoscutum and by the more rugose propodium. Types removed from slide and mounted on points; paratypes in the collection Kansas Agricultural College, slide-mounted.

CHALCIDOIDEA.

TORYMIDÆ.

MONODONTOMERINÆ.

Ditropinotus flavicoxus, new species.

Female.—Length 2.5 mm. Head and dorsum of the thorax golden green, strongly punctate, the punctures of the head somewhat finer than those of the thorax. Antennæ dark brown, nearly black; the scape and club orange yellow. Face below antennæ with sericeous white pile. Pleuræ, underside of thorax (except mesosternum, which is usually green), legs including all coxæ, and abdomen honey-yellow; the anterior coxæ and middle tibiæ are usually somewhat paler than the rest of the legs, and the apical tarsal joints are dark. Abdomen very finely, transversely lineolate, the ovipositor about half the length of the abdomen and black.

Male.—Entirely green, the abdomen slightly bronzed above. Antennæ wholly black. Coxæ and femoræ, except apically, dark brown, the tibiæ, tarsi, and apices of femoræ pale yellow. Body sculpture similar to that of the female.

Habitat: College Park, Maryland.
Type: No. 14356, U. S. National Museum.

Eight female and six male specimens collected by Mr. E. N. Cory, July 19, 1909, in a room in which were stored quantities of meal and other ground feed badly infested with several different coleopterous and lepidopterous pests of this class of stored products. It is probably, though not certainly, parasitic on some insect which infests stored cereals.

The species differs from *D. aureoviridis* Crwfd. in the female having all of the coxæ honey-yellow instead of green and in the absence of any green markings on the abdomen. The sculpture of the propodium is also slightly different. The males are not distinguishable.

ENCYRTIDÆ.

ENCYRTINÆ.

AGROMYZAPHAGUS, new genus.

Body metallic. Head transverse, seen from in front slightly broader than long; cheeks half the length of the eyes; eyes bare, nearly circular, converging above and extending to the occiput; vertex rather narrow; frons somewhat flattened, finely punctate, and with numerous larger, deeper punctures surrounding the forward ocellus; ocelli in a nearly equilateral triangle, the two lateral close to but not touching the eye margins; antennæ 11-jointed, inserted below the eyes, the scrobes triangular; scape slender, not reaching to the front ocellus; pedicel shorter than the first funicle joint; funicle joints thickened, cylindrical, the first joint slightly the longest, following joints subequal, one and a half times as long as wide; the club is flattened, not as long as half the funicle, its apex bluntly rounded, the first joint slightly longer than wide, the two following transverse. Thorax robust; mesoscutum short and broad, not more than half as long as wide and very finely shagreened; scutellum convex, as long as the mesoscutum, rounded posteriorly and delicately sculptured; metathorax smooth, impunctate, and without pubescence. Wings hyaline; the marginal vein short, not much longer than thick; postmarginal shorter than the marginal; stigmal about as long as the marginal and postmarginal together. Abdomen conic ovate, flattened above, not longer than the thorax; ovipositor not exserted. The male differs from the female in having the club of the antennæ shorter than the two preceding funicle joints, the funicle joints hairy, not especially thickened,

and distinctly notched above at the sutures; the first funicle joint is two or more times as long as the pedicel.

Type: Agromyzaphagus detrimentosus, new species.

In Ashmead's Classification of the "Chalcid Flies" this genus apparently falls nearest to *Coccidencyrtus*, but differs from that genus in that the antennal club is less than half the length of the funicle. The fact that the eyes are bare distinguishes it from *Ageniaspis* and the short pedicel will serve to separate it from most of the other genera.

Agromyzaphagus detrimentosus, new species.

Female.—Length 1.5 mm. Antennæ black with very short whitish pile, scape slightly metallic; scrobes deeply impressed; eyes reddish brown; face and cheeks bluish-green tinged with brassy, the former finely shagreened, the latter delicately lineolated. Head above and mesocutum finely shagreened, brassy green; scutellum copper-colored its sculpture finer than that of the mesoscutum; mesopleuræ steel-blue, very finely lineolate; metathorax and abdomen smooth, shining, impunctate, nearly black, but often slightly metallic. Wings hyaline, the anterior and posterior margins without cilia, the apical margin with very short cilia; veins brownish. Coxæ all metallic green; trochanters testaceous; anterior femoræ dark brown, their apices and tibiæ and tarsi pale yellow; median femoræ and tibiæ dark brown, the apex of femoræ, base and apex of tibiæ, and their tarsi pale yellow; posterior femoræ and tibiæ black, more or less metallic, their tarsi yellowish.

Male.—Exactly like the female, except in the antennal characters, as pointed out in the description of the genus and the fact that the flagellum is wholly testaceous instead of black.

Type: No. 14355, U. S. National Museum.

Habitat: College Park, Maryland.

Described from eleven females and seven males reared July 19, 1911, by Mr. O. G. Babcock and the writer, from the puparia of an agromyzid fly belonging to the genus *Leucopis*. The flies, which are probably *Leucopis nigricornis*, were feeding in the larval state upon an aphis infesting apple and also one infesting a species of thistle.

PROCTOTRYPOIDEA.

PROCTOTRYPIDÆ.

SCELIONINÆ.

Hoplogryon kansasensis, new species.

Female.—Length 2.5 mm. Black, more or less shining. Antennæ strongly clavate; scape long and reaching about to the forward ocel-

lus, slightly testaceous; pedicel conical, much narrower and less than half as long as the following joint, dark brown; flagellum about twice as long as the scape, blackish; the first joint not wider at base than the pedicel but much wider at its apex, second joint distinctly shorter than the first, one and a half times as long as thick, third and fourth joints subequal, transverse, about twice as wide as long; club joints transverse, but distinctly longer than joints three and four of the funicle, the two apical sutures slightly oblique, the apical joint rounded at its apex. Head black, strongly transverse; mandibles deeply toothed and brownish; clypeus strongly transversely striate; lower part of face, eye margins above, the temples, cheeks, and vertex also deeply striate; remainder of the face smooth and shining but with many deep punctures arranged in irregular rows on the upper half. Thorax black; mesothorax and scutellum coarsely punctate, mesopleuræ rugoso-striate; metathorax more or less rugoso-striate with three long pointed projections, one on the median line reaching to the middle of the first abdominal segment, and one at each posterior lateral angle considerably shorter. Wings slightly smoky, with a row of stiff black bristles along the subcostal and marginal veins. Legs including all coxæ brownish testaceous. Abdomen shining black, longer than the head and thorax, spatulate, the first segment wider at apex than long, its base narrow; second segment also much wider at apex than at base and about half as long as wide; third segment as long as two and three together, the following segments very short; segments one, two, and three are strongly longitudinally striate, the striations gradually fading out and disappearing before the apex and at the sides of the third.

Habitat: Manhattan, Kansas.

Type: No. 14354, U. S. National Museum.

One specimen was received from T. J. Headlee which had been secured from a cage in which experiments with the Hessian fly were being carried on and it is possibly, though not likely, a parasite of the fly.

The species is closest to *H. bethunei* Sanders, recently described, but differs as follows: The thorax is densely punctate instead of rugose, the metathoracic teeth are much longer, and the flagellum is more strongly dilated.

—Mr. Busck gave a very interesting account of the rearing of the man-infesting bot of tropical America.

ON THE REARING OF A DERMATOBIA HOMINIS LINNÆUS.

BY AUGUST BUSCK.

The literature on *Dermatobia* infesting man is very large and the biology of the species is fairly well studied and understood. Dr. Raphael Blanchard, in his classical paper, "Sur les Œstrides américains dont la larve vit dans la peau de l'homme" (Ann. Soc. Ent. France, vol. 61, pp. 109-154, 1892), gives a comprehensive review of the literature on this species from the first record in 1749 to the date of his article, and Dr. A. Neiva has lately given full synonymy and life-history with illustrations of all stages in his "Algumas informações sobre o Berne" (Chacaras e Quintaes, vol. II, no. 1, 1910, reprinted as a separate publication in Rio de Janeiro, 1911).

The following notes do not pretend to add anything new, but are merely an account of an actual breeding of the parasite from man, of which there is as yet no published record.

The writer has on several occasions become infested with the larva of *Dermatobia*, but has been unable to indulge his desire to breed the fly, because the inconvenience of an infestation interfered with work on hand. Acquiring, however, an infestation towards the close of my last stay in Panama, this summer, and in a reasonably inoffensive part of the body, upper left arm, I determined to let it remain and succeeded in rearing the fly.

The infestation took place at Cabima, Panama, on May 29; only one cast skin was observed during the larval period; this was shed and pushed out nearly entire through the aperture in my skin on July 19; on September 9 the larva had attained full growth and left the arm, posterior end first. It was at this time nearly 1 inch long (24 mm.) and 10 mm. in diameter. On being placed in a jar with wet sand it immediately burrowed down 2 inches to the bottom of the jar and pupated. The fly issued on October 23.

No exact observation on the oviposition is recorded in print and none was made by the writer; the egg is known only from dissected females, but there is no doubt that the larva hatches at once at the time of oviposition and normally bores into the skin just where it is deposited; for this reason the bulk of the infestations occur on exposed parts of the body, the arms, legs, and neck; but it is plainly either possible for the larva to travel some distance, if not satisfied with its first situation, or else survive a fall from this exposed place to another under the clothing of the host; the writer was thus infested by another larva earlier in the season just under the

shoulder blade, whereto the larva must have dropped or crawled from the neck. All my other infestations occurred on places which were exposed at the time.

The natives believe the swellings on their legs are caused by their wading across streams, at which time of course the fly has a good opportunity to oviposit.

To any observing person the infestation is noticeable from the very beginning, and the irritation is easily distinguished from the abundant mosquito and tick bites with which one is inflicted when "in the bush."

Within a week can be seen with the naked eye the characteristic, moist aperture in the skin through which the larva pushes and withdraws its anal end for breathing.

The larva, even when large, does not cause much pain if not interfered with, though it has the habit at times of rotating around its own axis with telling effect on the host's feelings.

On the whole, however, the inconvenience is greater than the pain, the constantly exuding fæces of the larva necessitating a bandage so as not to soil underclothing and bed linen. Towards maturity the larva gradually enlarges the aperture in the skin and its final egress is more relief than pain.

But I am inclined to ascribe to the larva a more serious effect on its host. During no period of my entire adult life have I required as much sleep as during the months of infestation with this parasite; from 3 to 5 hours were almost daily regretfully added to my normal sleeping hours and during the day I felt less alert and energetic than is my wont. This was the more noticeable to myself and to my nearest associates, because I for more than twenty years have been in the habit of indulging in a minimum of sleep. When the larva had left my arm this desire for sleep stopped and I was able to return to my normal habits.

I am well aware that the evidence of this single experience is not sufficient to establish the guilt of the larva; other causes not perceived by me may have produced my condition, but I wish to record my belief that the *Dermatobia* larva was the cause. Is it not possible that these larvæ produce some virus which has a quieting effect on the host? Ability to quiet the host during incubation would be a distinct advantage to the species.

During his stay in Panama the writer observed what is now known to be the same species in monkey and dog.

Having been the victim of a pretentious surgical operation, with subsequent stitches and bandages, which was thought necessary to remove a half-grown larva in my back, which I could not myself reach around and attend to, I may be ex-

cused a note on the technique of removing such a larva from a suffering host. There is no need of knife and bloodshed; at any time of its life the larva may be easily removed simply by pressure, after the aperture has been softened and somewhat enlarged by insertion of a pair of thin forceps; but the shape of the larva should be kept in mind; its thin anal end lies toward the surface of the skin and the swelled bottle-shaped part is downwards; hence it is necessary to apply the pressure well below the swelled part or it will only tend to force the larva further down.

Mr. Knab spoke of the widespread and common occurrence of *Dermatobia* throughout tropical America and of the Mexican and Central American records in numerous papers that have appeared on the subject. Several different species have been thought to exist, but it now appears that they are all one. Both Aldrich and Coquillett seem to have been skeptical of the occurrence of *Dermatobia* north of Panama, or unable to cope with an insect usually observed only in the larval stages. Mr. Busck said that in Trinidad the larvæ commonly infested the head, but this was not so in Panama. Mr. Knab said there are no actual observations on the mode of oviposition. The several stages of the larvæ differ and were at one time considered different forms. In tropical Africa a muscid parasite of man (*Cordylobia*) lives under the skin in the same way. It was supposed that the eggs were deposited directly on the exposed skin, as persons bathing became most frequently infested. Recently von Pelser-Berensberg determined that the eggs are not deposited directly upon the skin but on the clothing and do not hatch until two days later. Mr. Hammar said that while in South America he had been infested with *Dermatobia* several times. There appeared to be two kinds of larvæ, black and white. The natives believe the eggs are laid on the foliage. He had found young larvæ crawling on the skin before entering. Mr. Crawford spoke of the finding of a cast skin in the burrow with the maggot which he was having cut out in Costa Rica. Mr. Schwarz spoke of Dr. LeConte's observations and method of extraction as published in his edition of Say's entomolgical writings. Mr. Hammar said the native remedy was to tie chewed tobacco over the hole. Mr. Knab stated that the larva does not penetrate below the connective tissue.

—Mr. H. M. Russell, under the title "A Hymenopterous Parasite of Thrips," gave an abstract of his observations in California.*

—Under the heading Notes and Exhibition of Specimens Dr. Dyar called attention to a published charge by Prof. John B. Smith that type labels in the National Museum had been tampered with (Journ. N. Y. Ent. Soc., XIX, 151, 1911). He said that the basis of this serious charge was that Professor Smith had, a number of years ago, confused together two similar species of Noctuidæ. Smith had described a species from four specimens, and, as it now appears, of these he left two in the National Museum and took two for his own collection. It so happened that the two in the National Museum were of one species, the two in Smith's hands, another. Recently Smith, in revising the genus, based the species in his redescription upon the specimens in his hands and described the other form under a new name, unconscious of the fact that this form already constituted part of the types of his earlier species. Dr. Dyar had pointed out, from the types in the National Museum, that Smith had redescribed his own species, and he proposed another name for the species which Smith held under the old name, being unaware of the existence of other types in Smith's hands. Hereupon Smith claimed that the types in the National Museum were really conspecific with those in his hands and that if they were not so, then the type labels had been changed! He states that the two species are "so utterly different in size, in color, in maculation, and even in wing form, that mere error of association is excluded."

Dr. Dyar expressed himself as deeply incensed at this ridiculous charge, which, he said, was prompted by malice and supported by misstatement. He exhibited specimens of the forms in question, showing that they were in fact near allies and not widely separated species, as Smith's statements would imply. Such might very easily have been originally confused by Smith. In fact, Smith in his original description refers

*Already published, Proc. Ent. Soc. Wash., XIII, 235, 1911.

to the great variability of the form before him. Dr. Dyar further stated that he had a suspicion that the forms would ultimately prove to be varieties of one species, in which case it would be found that Smith's earlier position, which he now so radically repudiates, was in fact the more correct one.

In regard to the names of these forms, Dr. Dyar said that in spite of the discussion, the types of the original *Pleonectyptera finitima* Smith had not been fixed. The species was based on four specimens and Dr. Dyar proposed herewith to restrict the types to the two in the National Museum. This makes *P. tenalis* Smith synonymous with *P. finitima*, and leaves the name *P. cumulalis* Dyar available for the other form, all as stated in Dr. Dyar's paper published in the Pomona College Journal of Entomology.

—Mr. Walton presented the following:

NOTES ON CERTAIN SPECIES OF FLIES.

By W. R. Walton.

Microdon lætus Loew.

The writer has already published a note regarding this syrphid in Entomological News. It is listed among the additional species but not described in Dr. Williston's Synopsis of the North American Syrphidæ. The type locality is Cuba, but the present specimens were collected near Harrisburg, Pennsylvania, by Mr. Frank Craighead and H. L. Adams, respectively. There is also one additional specimen in the collection of Mr. E. Daecke at Harrisburg, which was collected by the writer.

Eristalis montanus Williston.

Dr. Williston described this species from a unique male taken at Como, Wyoming, at an elevation of 7,000 feet, and the female has since been described by Mr. W. D. Hunter (Can. Ent., vol. XXVIII, p. 98). Specimen was taken at Soda Springs, Idaho. Mr. Hunter subsequently collected several specimens in northwestern Nebraska. All the specimens so far recorded have been taken at elevations exceeding 4,000 feet. The present specimen was collected at Real del Monte, Mexico, a silver-mining camp 9,000 feet above sea level, by Mr. H. T. Van Ostrand. This is one of the few species of *Eristalis* from North America not hitherto represented in the collection of the U. S. National Museum.

Eristalis vinetorum Fabr.

The present specimen was collected at Hertford, North Carolina, by the writer, during the past summer. This seems to be the most northerly latitude yet recorded for the species, which is common enough from Georgia southward.

Synthesiomyia braziliana B. & B.

This species, the type locality of which is Brazil, has hitherto been recorded from but few localities in the United States. Hough records it from Florida and Georgia and Mr. H. G. Hubbard collected one specimen from a cave in Florida, which by the way, is credited in Aldrich's catalogue to Mr. C. W. Johnson, who first published the record. The present specimen was collected by Mr. D. K. McMillan at Brownsville, Texas.

It is herewith exhibited in company with a species of *Sarcophaga* in order to call attention to the extreme similarity in habitus of the two species.

Johnsonia elegans Coq.

Mr. Coquillett erected the genus *Johnsonia* for this species on a single specimen, collected by Mr. C. W. Johnson, at St. Augustine, Florida, in 1895. Mrs. Annie Slosson subsequently collected several specimens in the same State. The present specimen was taken at Eberlys Mill, near Harrisburg, Pennsylvania, by the writer, The genus is undoubtedly a valid one, but the several individuals to which Mr. Coquillett has applied a common specific name differ so markedly as to indicate that at least two species may be included.

The present individual is one-third again as large as the type specimen and has been determined by Mr. Coquillett. It is exhibited in company with a tachinid fly, namely, *Tricophora ruficauda* van der Wulp, to which it bears a remarkable, though of course superficial, resemblance.

—Dr. Dyar spoke of the larva of *Doa ampla* Grote, which had been sent to him by Prof. T. D. A. Cockerell. Prof. Cockerell found the larva at Boulder, Colorado, on an euphorbiaceous plant, and originally sent it for determination. Dr. Dyar at that time had no idea what it was; but later Prof. Cockerell succeeded in breeding the adult. Dr. Dyar said that the species had been variously referred to different families, having been first described as a lithosian, in the European genus *Emydia* Boisd. The moth by its venation is

neither a lithosian nor an arctian, nor does it belong to the Liparidæ. It will come in the group called Hypsidæ by Sir G. F. Hampson, a group including the forms that we have classed under the term Pericopidæ. The larva is smooth, brightly colored, the setæ degenerated and nearly lost, but the subventral ones with duplicated hairs. It is thus the possessor of many-haired warts, which have degenerated to give place to a bright and conspicuous coloration. The larvæ of the Pericopidæ possess a similar structure, except that in general the warts and hairs are well developed and functional, although in some, like *Composia fidelissima* H. S., the hairs are few and the coloration of the skin is bright. Therefore there is nothing in the structure of the larva of *Doa ampla* to prevent its reference to the Hypsidæ. Dr. Dyar further said that he would add a description of the larva for publication, which follows:

Larva.—Head small, rounded, notched behind at the vertex, flat before, smooth shining black, the epistoma and bases of antennæ white. Body with the thorax roundly enlarged, swollen, the rest evenly cylindrical, subtruncate behind. The enlarged thorax is black, with large rounded angular white spots, while the central region is yellow with broad black bands. Thoracic white spots subdorsal and lateral on joints 2 and 3; on joint 4 they are yellow, the lateral one partly divided; broad black dorsal and lateral stripes on joints 5 to 12, the lateral one joined to a series of quadrate black patches in the centers of the segments; subventral region and bases of feet black; venter pale. On joint 11 posteriorly to the end of the body the black color again prevails, broken by a subdorsal and lateral white spot on joints 12 and 13. Thoracic feet and anal shield black.

Cocoon.—An open mesh of brown silk, in which the pupa has considerable play. The cast larval skin is included. The pupa is uniformly brown.

—Mr. Schwarz remarked shortly on the northward flight of the cotton worm moth (*Alabama argillacea*), a phenomonon which has not been observed in the city of Washington for about twenty-five years. During the present year, 1911, the moths were first observed in the city on September 19 and from that date they were observed almost daily until October 19, being present sometimes in enormous number of specimens. They were also observed on Plummer's Island, Mary-

land, on September 23 and October 3, where they were attracted by the acetylene light.

In this connection Doctor Howard stated that he and Dr. K. Escherich, of Tharandt, captured an apparently fresh female of the cotton moth on the window of a parlor car going into Chicago on the afternoon of September 25. He also stated the following instances of northern distribution for this autumn had come to him in his general correspondence:

Through the summer reports of damage by the larvæ came frequently from various parts of the South.

September 15, they were reported as ruining the cotton at Norfolk, Virginia. (T. C. Johnson.)

September 16, the moths were sent in from Romney, West Virginia, where they had been damaging peaches. (J. J. Cornwell.)

September 22, they were sent in from Lookout Mountain, Tennessee, where their occurrence in the house in numbers had alarmed the housekeeper. (Mrs. M. W. Gill.)

September 25, they were captured at Indiana, Pennsylvania, under an arc light, and sent to the Bureau. (G. W. Sloop.)

September 26, they were reported from Cincinnati, Ohio, as damaging ripe fruit, especially peaches, so that it was necessary to pick the fruit in order to save it. (J. Benckenstein.)

September 28, reported from Agate, Nebraska, as swarming about the lamps by thousands and being very annoying in houses. (S. D. C. Bassett.)

September 29, they were sent in as congregating about the arc lights in Cumberland, Maryland. (J. G. Lyon, Jr.)

The same date, they were received from Indianapolis, Indiana. (B. W. Douglass.)

The same date, from Richmond Hill, Long Island, New York. (W. A. Bernhard.)

September 30, Keokuk, Iowa, hundreds of the moths collected on windows and telegraph poles. (J. M. Shaffer.)

October 2 and 5, they were reported in occurring in mills at South Haven, Michigan. (H. Haupt, Jr.)

October 10, reported as occurring in the streets in New York City, Yonkers, Brooklyn, and Newark, and as occurring in numbers in the upper stories of tall buildings. (Theo. Mead.)

October 13, reported from Fairmont, West Virginia, as having been destroyed by the hundreds of thousands by the lights of the town. (H. A. Williams.)

October 18, Charleston, West Virginia, millions reported covering poles and the ground near electric light following an almost continuous rain for 24 hours. (W. O. Daum.)

October 19, reported as swarming in an orchard at Goodland, Indiana, by thousands. (Miss Myrtle E. Alter.)

October 20, Beaver Falls, Pennsylvania, moths flying about the lights at night in great numbers. (M. R. Tullis.)

October 30, correspondent at Shephard, Ohio, reported that one night in September a light shower fell and the next morning the premises were covered with these moths. (Mrs. Chas. Matthews.)

Mr. Gahan spoke of letters from four correspondents of the Maryland Experiment Station, which tell of extensive swarms of this moth in the western part of the State during the latter part of September and early part of October. The first letter is from D. W. Crowther, Smithsburg, Washington County, under date of September 20, and states that the moths are abundant in his peach orchard, and that they collect in large numbers on the specked fruit. September 28, Mr. Edward Harris, of Cumberland, Allegany County, sent specimens and stated that the moth was present in large numbers in the city of Cumberland. Again on October 4, Mr. Harris wrote that the moth was still plentiful and that it had been reported from Piedmont and Keyser, West Virginia.

October 2, a correspondent of a Baltimore paper, whose letter was referred to the experiment station for reply, wrote that Allegany County was deluged with the moths, which collected on the electric-light poles in such numbers as to cover them.

October 4, G. W. Thomas, of Adamstown, Frederick County, sent specimens and stated that they were abundant in his vineyard, where they were apparently eating the punctured grapes.

Numerous specimens were observed by the speaker on the windows of his home at Berwyn, Maryland, one evening during the first week in October.

MEETING OF DECEMBER 7, 1911.

The 254th regular meeting was entertained in the Saengerbund Hall, 314 C street N. W., by Dr. L. O. Howard. President Webster occupied the chair and twenty-six members (Messrs. A. C. Baker, Banks, Barber, Busck, Caudell, Cory, Cushman, Dyar, Ely, Heidemann, Hopkins, Howard, Hyslop, Jenne, Fred Johnson, Knab, McAtee, Myers, Phillips, Rohwer, Sanford, Sasscer, Schwarz, Vickery, Viereck) and four visitors (Messrs. Demuth, Grosvener, Urich, and Siegler) were present. The minutes of the 253rd regular meeting were read and approved.

Mr. Rohwer read his report as Secretary-Treasurer. The Chair appointed Messrs. Banks and Caudell as auditors. Dr. Howard moved the report be accepted and placed on file and that the recommendations contained in it be referred to the executive committee.

The Chair introduced the subject of the approaching meeting of the A. A. A. S. with its attending corps of visiting entomologists. Motion was made (Schwarz), seconded (Knab), and carried that it is the sense of the Society that we entertain the entomological contingent at a smoker, the expenses to be paid by subscription. Mr. Schwarz stated that at an Executive Committee meeting he had been appointed a committee of one to investigate and find what arrangements could be made. That the only available place and time appears to be the Saengerbund Hall, Friday night, December 29. Motion to accept the arrangements as made was carried. Dr. Howard moved that Mr. Schwarz as chairman of the committee of one for these arrangements be authorized to increase its membership as desirable. Carried.

Mr. Schwarz moved the election of Dr. K. Escherich, of Tharandt, Germany. Carried.

Under new business Mr. Rohwer read the proposed amendments to the Constitution. Mr. Caudell moved their adoption, seconded by Mr. Knab. Carried. Mr. Rohwer moved that the Society publish the revised Constitution in the first number of the forthcoming volume. Seconded by Mr. Caudell. Carried.

The following officers were elected for the year 1912: President, A. L. Quaintance; First Vice-President, August Busck; Second Vice-President, A. N. Caudell; Recording Secretary, E. R. Sasscer; Secretary-Treasurer, S. A. Rohwer; additional members of Executive Committee, H. G. Dyar, Nathan Banks, and E. A. Schwarz. Prof. A. L. Quaintance was elected to represent the Society at the Washington Academy of Sciences.

Mr. F. W. Urich was called upon and gave a very interesting and detailed account of the spittle insect that is so injurious to sugar cane in Trinidad.

THE CONSTITUTION OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON.

Article I.—Name.

The name of this organization shall be The Entomological Society of Washington.

Article II.—Objects.

The objects of the Society shall be to promote the study of Entomology in all of its bearings, to publish a magazine containing its proceedings and such papers as are accepted for publication, and to cultivate social and friendly relations between those in any way interested in the science.

Article III.—Members.

Section 1. The Society shall consist of active, corresponding, and not more than ten honorary members. Active members must be residents of the cities of Washington, Baltimore, or vicinity. Corresponding members may be from any State or country. Honorary members can be selected only from among foreign entomologists.

Section 2. Any active member of the Society, in good standing, who may leave the cities above named to reside for a year or more elsewhere, may, on motion of any active member of the Society, or at his own request, be transferred to the list of corresponding members, and shall for the time of absence have the privileges of such members only.

Section 3. Candidates for active membership may be proposed at any stated meeting by any active member, but shall not be elected until the next following meeting, except upon the motion of some person other than the proposer, and upon

unanimous consent of those present. A two-thirds vote of the active members present shall be required to elect an active member. Corresponding members, except those who become such by removal, may be proposed in the same way as active members, but the name must be referred to the Executive Committee, who shall at the next meeting report on the same. A two-thirds vote of the active members present shall be required to elect. Honorary members shall be proposed only by the Executive Committee, and may be elected at any stated meeting without lying over as in case of active members. A unanimous vote of the active members present is required to elect. The election of active or corresponding members may be by ballot or viva voce. Honorary members shall be elected by ballot only.

Article IV.—Officers.

The officers of the Society shall be a President, a First Vice-President, a Second Vice-President, a Recording Secretary, and a Corresponding Secretary-Treasurer, to be elected by ballot at the annual meeting. There shall be an Executive Committee consisting of the officers of the Society and three members to be elected by the Society in the same manner.

Article V.—Duties of Officers.

Section 1. The President, or, in his absence, one of the Vice-Presidents, shall preside at the meetings of the Society and of the Executive Committee. It shall be the duty of the President to deliver an address at the closing meeting of the year.

Section 2. The Recording Secretary shall take and preserve a record of the Proceedings of the Society.

Section 3. The Corresponding Secretary-Treasurer shall conduct all of the official correspondence of the Society, shall keep a list of all the members, together with their addresses, and shall give due notice of all meetings. He shall have charge of all moneys of the Society, and shall make disbursements only under the direction of the Executive Committee. He shall collect all fees and assessments, and notify all members who are in arrears, and submit a report of the state of finances of the Society at the annual meeting, or whenever called for. He shall preserve all publications and other property belonging to the Society.

Section 4. The affairs of the Society shall be conducted by the Executive Committee, whose duty it shall be to act on nominations for membership, have direction of the finances,

audit the accounts of the Treasurer and provide for the meetings and for publication, and transact any other necessary business.

ARTICLE VI.—MEETINGS.

The regular meetings of the Society shall be held, unless otherwise ordered, on the first Thursday of each month. The annual meeting for the election of officers and the delivery of the presidential address shall be the regular meeting for the month of December. The terms of office shall begin January first. Special and field meetings may be called by the Executive Committee. Not more than one half hour shall be devoted to the consideration of business at any regular meeting.

ARTICLE VII.—FEES.

SECTION 1. The initiation fee of active members shall be one dollar; the annual fee shall be three dollars, due three months after election, except when elected three months or less previously to the annual meeting, when no fee shall be required for the year in which they are elected. Any active member in arrears for one year may, after one month's notification, be dropped from the rolls. No member in arrears shall be entitled to vote.

SECTION 2. Corresponding members shall pay no initiation fee, but shall pay an annual fee of two dollars, due three months after election and at the first of each following year.

ARTICLE VIII.—AMENDMENTS.

The Constitution of the Society may be amended at any regular meeting of the Society by two-thirds vote of the active members present, providing that such amendment has been passed by the Executive Committee and presented to the Society at least one month previously.

ARTICLE IX.—ORDER OF BUSINESS.

The order of business at the regular meetings, unless othwise ordered by the Executive Committee, shall be as follows:

1. Reading and approval of minutes.
2. Report of officers and committees.
3. Election of members.
4. Miscellaneous business.
5. Reading of papers, discussions, and exhibition of specimens.

The following papers were accepted for publication:

ON THE PROBABLE OCCURRENCE OF THE MYMARID GENUS DICOPUS ENOCK IN FIJI.

BY A. A. GIRAULT.

Several months ago I sent in the manuscript of a paper describing a North American species of Mymaridæ from a single male specimen sent to me from Canada and which I named *Dicopus halitus*. While on my way to Australia in September, 1911, I had an opportunity of stopping off for a few hours at Suva, Fiji, and during that time managed to collect a few parasitic Hymenoptera. Among these was a single male mymarid generically allied with the American form *halitus* and which also must be for the present referred to the same genus. This Fijian species, like the American form, is very minute, also extremely delicate, and was extraordinarily difficult to capture; it was moving slowly over the pane of a window, but I was not able to keep sight of it for more than the fraction of a second at a time. This fact, taken in conjunction with its fragility, made it necessary to spend three-quarters of an hour in effecting its capture. Thereafter I was exceedingly fortunate in being able to transfer it to a slide of xylol balsam, considering the circumstances and lack of facilities for such work. Whether the species is indigenous to the Fiji Islands or not cannot now be determined, especially since our knowledge of the Mymaridæ is so scanty.

For obvious reasons I believe it incumbent on me to describe the form, which is done herewith:

Dicopus psyche, new species.

Position normal; abdomen sessile; tarsi 5-jointed.

Male.—Length, 0.20 mm. Very minute; visible as a mere fleck of dust. General color grayish, the legs and antennæ concolorous; fore wings characteristic because of the fact that they are clouded throughout, but in the distal part of the wing blade the clouded area is more confined to the midlongitudinal line of the wing and is consequently margined with a hyaline area in that part. The edges of the fore wing are as usual yellowish. Distal half of the abdomen and coxæ darker; trochanters pallid.

The same as *Dicopus halitus* Girault, but differing in the following structural characters: In the fore wing there is no midlongitudinal line of discal cilia in the distal part of the blade; excepting a single short line of two or three minute setæ, and along each side, between the margin and the middle line, a single line of larger setæ, this line extending to the apex along each side; the middle line is obscure and at the base of the distal third of the wing and does not reach the apex

by some distance. In the antenna a marked difference in that the second funicle joint is not abruptly narrower and slightly shorter than the first, but of equal width and distinctly longer (nearly twice longer); the scape is long, thrice or more the length of the pedicel; the first funicle joint is subequal in length to the pedicel; funicle joints 3 and 4 are subequal, longest of the funicle, each a fourth or more longer than funicle joint 2; funicle joints 5, 6, and 7 subequal, shorter, each slightly longer than joint 2 of the funicle, 8 and 9 subequal, slightly longer, club joint conical, somewhat shorter than funicle joint 9. Scape by far the longest antennal joint. Pubescence of antenna inconspicuous.

Female.—Unknown.

Described from a single male specimen captured from the pane of a window in a woodworker's shop, Suva, Fiji, during the afternoon of September 22, 1911. A species characterized by the color of the wings, the grayish body color, and structurally by the slender and moderately long second joint of the antennal funicle.

Host: Unknown.

Habitat: Fijian Islands (Suva).

Type: No. 14483, U. S. National Museum, Washington, D. C.; one male in balsam.

A NEW SPECIES OF THE MYMARID GENUS POLYNEMA HALIDAY FROM BRITISH COLUMBIA.

BY A. A. GIRAULT.

The following new species is not included within the census of Mymaridæ of North America recently published by me.* It seems to be quite distinct from any of the forms so far described from the United States or Mexico and is the first species of the genus to be recorded from Canada. A second species, common in the United States, is also recorded from Canada.

FAMILY MYMARIDÆ.

SUBFAMILY MYMARINÆ.

TRIBE MYMARINI.

Genus POLYNEMA Haliday.

1. **Polynema striaticorne** Girault.

A single female specimen of this species was captured by sweeping in original forest, Stanley Park, Vancouver (B. C)., Canada, September 5, 1911. It had broader fore wings than

*Trans. American Ent. Society, Phila., XXXVII, pp. 253-324.

usual and the caudad coxæ were more yellowish than with the average specimen of the species.

2. **Polynema regina,** new species.

Position normal.

Female.—Length, 0.90 mm.; moderately small for the genus. General color black; legs, petiole of abdomen, antennal scape, and pedicel intense orange yellow, the former tinged with dusky only in places—the cephalic femora at proximal third and all tibiæ slightly along their middles exteriorly; distal tarsal joint, however, black; first four funicle joints of antennæ diluted with yellowish. Wings hyaline.

Another species falling within the group of allied species containing *consobrinus* Girault, *aspidioti* Girault, *striaticorne* Girault, *howardii* Ashmead, *euchariforme* Haliday, and *brittanum* Girault, but resembling more nearly the first.

It differs from it as follows: In the nearly uniformly intense yellowish legs, antennal scape and pedicel, and abdominal petiole; then in the shape and ciliation of the fore wings—the discal ciliation is somewhat coarser, the individual cilia somewhat longer, but there are about the same number of longitudinal lines; the marginal cilia are distinctly longer at all margins, the longest (caudo-distad) about three-fourths the wing's greatest width; those at the apex of the wing are nearly as long as the longest cilia of the fore wing in *consobrinus;* the longest are twice the length of the longest cilia of the caudal wing, which is not true for *consobrinus*, where the the two sets of cilia are more nearly equal. The proximal tarsal joints are somewhat longer in *regina*. Otherwise about the same.

Male: Unknown.

Described from a single female specimen captured with the species recorded above.

Habitat: Canada—Vancouver, British Columbia.

Type: No. 14512, U. S. National Museum, Washington, D. C., one female in xylol balsam (mounted on a slide with a specimen of *striaticorne* and a proctotrypoid).

A species characterized by the intense orange-yellow legs, the short proximal funicle joint of the antennæ (distinguishing it from such species as *psecas* Girault and *enockii* Girault) and the shape and ciliation of the fore wings. It should also be compared with the species like *maculipes* Ashmead, *zetes* Girault, and *longipes* Ashmead.

A REVISION OF THE GENUS LASCONOTUS ER.

(Coleoptera; Colydiidæ.)

BY E. J. KRAUS.*

Since 1890, when Colonel Casey published descriptions of several new species of *Lasconotus*, practically nothing has been written concerning the species occurring in the United States. In the interval several new forms have accumulated, and the present opportunity is taken to describe them and make a complete revision of the genus.

In the synopsis of species will be found the type locality of each species, and under the discussion of species will be found a complete list of localities from which specimens have been examined. The designation Hopk. U. S. refers to specimens in the Forest Insect Collection, largely collected by Dr. A. D. Hopkins, H. E. Burke, J. L. Webb, and W. F. Fiske during investigations in the Branch of Forest Insect Investigations of the Bureau of Entomology. The designation U. S. N. M. refers to specimens in the U. S. National Museum. For the latter, credit is given in each case, where known.

I wish to express my sincerest thanks and appreciation to Mr. E. A. Schwarz, who turned over to me the abundant material in this group in the U. S. National Museum for study, and to whom I am greatly indebted for more numerous kindly helps and suggestions throughout the preparation of this paper than I can well enumerate; to Dr. A. D. Hopkins, who has kindly allowed me free use of all the material and notes in the Forest Insect Collection; to Mr. S. Henshaw, of the Museum of Comparative Zoology, at Cambridge, Mass., for the privilege of making a personal examination of the LeConte types; to Dr. H. Skinner, of the Philadelphia Academy, who extended a like courtesy with respect to the Horn types; and especially to Mr. W. F. Fiske, who most generously allowed me the use of his unpublished systematic notes on this genus.

The genus *Lasconotus* was described in 1845 by Erichson, who based his description on an undescribed species from Mexico. He characterizes it as follows:

> Die Schienen an der Spitze ein wenig erweitert, und hier ausser den kleinen Enddornen noch mit feinen Dörnchen besetzt. Die drei ersten Glieder der Füsse gleich kurz. Fühlerkeule dreigliedrig. Körperform und fast auch die Sculptur von Ditoma. Die Augen vollkommen rund, ganz unter dem Seitenrande der Stirn liegend, welcher sich oberhalb derselben bis zum Scheitel fortsetzt. Die Spitze der Mandibeln zweizähnig. Die Fühlerrinnen auf der Unterseite des Kopfes undeutlich. Eine neue Art aus Mexico.

*This paper was written by the author while in the employ of the Bureau of Entomology, U. S. Department of Agriculture, under the direction of Dr. A. D. Hopkins, in charge of forestry insects.

Dr. LeConte in 1859 first recognized the genus in America and referred to it a new species, *L. complex*, which, being the species first described in the genus, should stand as its type.

In 1866 Pascoe erected the genus *Illestus*, and referred to it a new species from Mexico, *I. terrenus* Pasc. He separates this genus from *Lasconotus* mainly by the character of not having the side margins of the head covering the eyes. As pointed out by Dr. Horn (1878), this character is well marked in but a few species, becoming gradually less until it is scarcely traceable, and he concludes that *Illestus* is synonymous with *Lasconotus*. I have seen three specimens of *I. terrenus* Pasc. collected at Toluca, Mexico, and determined by Dr. Sharp. They are quite different from any *Lasconotus* known to me in the following readily observable characters. The anterior coxal cavities are apparently open, but in fact very narrowly closed behind, the tibiæ scarcely everted externally and armed with a row of close-set spines instead of two prominent spines and several small ones, and the terminal segment of the maxillary palpi truncate, not at all rounded at the apex. In Pascoe's figure the antennæ are shown as twelve-segmented. This is obviously an error in drawing; it is not observable in the specimens.

The genus *Lasconotus* is quite readily divisible into well-marked groups, but there seems to be no sufficiently well-defined, constant structural character for separating them as distinct genera. The fore tibiæ are usually everted externally, though in some species merely rounded, and always armed at the apex with two prominent spines. Several smaller spines extend from the outer to the inner apical angle, which is armed with two short, straight spurs. The anterior coxal cavities are closed behind the posternal epimera, broad behind the coxæ. There is considerable range in size and general outline, though within the species these characters are very constant. The head, antennæ, ventral surface, and especially the elytral and pronotal sculpture, furnish excellent and remarkably constant taxonomic characters.

Very little is known concerning the exact habits of the species. They are usually found associated with various scolytids inhabiting coniferous trees. Principal among these are *Pityophthorus* (*Tomicus*), and at least two species are found with *Phlœosinus*. Whether they are commensals or predaceous is not well known. The mouthparts, so far as I have examined, would indicate a predaceous habit, but even if so, whether they prey upon the scolytids themselves or the

numerous other insects found in their galleries is still an open question. The larva is also so far unknown.

In the following synopsis and descriptions the sutural interspace in either elytron is considered as the first. The odd interspaces (1, 3, 5, 7, etc.) are always the more elevated, while the even (2, 4, 6, etc.) are frequently so flattened and unarmed as to appear obsolete, or nearly so, and in such instances the intervals between the costæ have apparently a double row of punctures, which character is frequently mentioned in former descriptions. In no instance are the even interspaces truly obsolete, however, and I have mentioned them throughout the descriptions.

The locality given under each species is the *type locality*. A full list of localities from which specimens were at hand is given at the end of the brief summary of each species following the synopsis:

SYNOPSIS OF SPECIES.

Pronotum subquadrate, with a distinct broad longitudinal impression just within the side margins, extending from anterior to posterior margin.. DIVISION I

Pronotum of varying shape, very narrowly or not at all margined, never with broad longitudinal impression from posterior to anterior margin... DIVISION II

DIVISION I.

Interspaces 1, 3, and 5 equally elevated from base to apex; pronotum subquadrate, its side margins straight, not narrowed behind... SUBDIVISION A

Interspaces 3 and 5 more elevated than 1, and 3 decidedly more elevated from vertex to apex than 5; prothorax more or less narrowed posteriorly... SUBDIVISION B

SUBDIVISION A.

Length 2.5 mm. Light ferruginous, elytra parallel, even interspaces appearing obsolete, margins of head very strongly reflexed, front granulate, with a prominent acute longitudinal median tubercle, pronotum as wide as elytra at base, pronotum with two pairs of longitudinal costæ, the outer pair nearly straight on anterior margin, joined in a broad U curve to the middle pair, the latter tortuous, broken at posterior 3/4, but continued parallel and in closer approximation to the posterior margin, where they are joined by a transverse ridge.. *mexicanus*, n. sp.

Mexico (Guanajuato.)

SUBDIVISION B.

Pronotum, when viewed from side, with a strong flexure anterior to middle.. SECTION A1
Pronotum, when viewed from side, straight, without flexure. SECTION A2

SECTION A1.

Length 3.8 mm. Castaneous, elytra slightly narrowed anteriorly, margins of head but slightly flexed, front faintly concave, granulate, epistoma with anterior margin deeply acutely emarginate, prothorax with the side margins acutely angled slightly anterior to middle posterior, to which they are straight and convergent; two pairs of dorsal longitudinal costæ, the outer pair obtuse, feebly sinuate, the inner pair tortuous, dichotomous, near either extremity the branches again united at either margin; even interspaces of elytra a little narrower than strial punctures, the latter regular, subquadrate........................ .... *flexuosus*, n. sp.
Washington (Hoquiam.)

SECTION A2.

Length 4 mm. Piceous, pronotum with two distinct pairs of longitudinal costæ, the middle pair equally elevated throughout, irregularly curved, broken at posterior 1/4, then continued in closer approximation and slightly diverging to posterior margin, outer pair sinuate and broadly joined to inner or outer margin; margins of prothorax broadly rounded, head faintly concave, epistoma slightly elevated, anterior margin deeply rather than broadly emarginate; elytral sculpture as in the preceding.. *complex* Lec.
California (Punto de Los Reyes).

Length 3.7 mm. Piceous, pronotum with middle pair of pronotal costæ broken up into acute elevations connected by feebly elevated ridges, these elevations form an almost perfect square at centre of pronotum, posteriorly and anteriorly, however, represented by two acutely elevated lines, outer pair joined to inner pair on anterior margin in a broad U curve, becoming obsolete or but feebly elevated posteriorly; side margins of prothorax broadly curved, scarcely narrowed posteriorly, posterior angles acute and noticeably curved backward; elytral sculpture and structure as in *flexuosus;* head similar to *complex*, but with epistoma more convex and its anterior margin very feebly broadly emarginate. *tuberculatus*, n. sp.
South Dakota (Elmore).

Division II.

Interspace 5 not decidedly more elevated than 3, elytra convex or flat, never strongly concave............................ Subdivision C

Interspace 5 decidedly more elevated or broader than 3, elytra usually concave dorsally.................................... Subdivision D

Subdivision C.

With none of the interspaces elevated, but in their place slightly broader, flattened, nude, and impunctate intervals which are interrupted at long distances by small tumid elevations, bearing a dense tuft of whitish setæ....................... Section A3

With the alternate interspaces strongly elevated or but very feebly elevated and crested with silvery setæ............ Section A4

Section A3.

Length 2.7–3.4 mm. Prothorax fully as wide anteriorly as long, strongly narrowed from apex to base, the sides broadly strongly sinuate throughout, dorsal area granulato-punctate, the costæ obtuse, crested with yellowish pubescence.
nucleatus Casey

California (Monterey).

Section A4.

Pronotum with three pairs of more or less clearly defined, obtuse, feebly elevated, tortuous, interlacing costæ crested with silvery pubescence.. Subsection B1

Pronotum with one or two pairs of obtuse costæ either straight or occasionally sinuate...................................... Subsection B2

Subsection B1.

Elytra with interspaces 3, 5, and 7 with a double or triple row of very short setæ, greatly more elevated than even interspaces, strial punctures deep, regular, well defined, without setæ.. Series C1

Elytra with interspaces 3; 5, 7 with a single row of long overlapping setæ, scarcely more elevated than even interspaces, but clearly distinguished from them by bearing the long setæ, strial punctures each with a bristle pointed obliquely backward... Series C2

Series C1.

Length 3 mm. Body ferruginous, prothorax broader than long.
borealis Horn

Michigan (Marquette).

Length 3.2 mm. Body piceous, prothorax longer than broad, posteriorly narrower than elytra, sides strongly sinuate and narrowed posteriorly, posterior angles acute, anterior broadly rounded; head longer than broad, front granulate,

broadly impressed at either aide, side margins scarcely reflexed, diverging posteriorly; elytra subparallel, interspaces 3 and 5 about equally elevated, strial punctures regular, deep, subquadrate........................ .... *intricatus*, n. sp.
Washington (Hoquiam).

SERIES C2.

Length 2.4–2.6 mm. Piceous, extremely narrow, ninth joint of antennæ much shorter and narrower than tenth; prothorax with with side margins, broadly feebly sinuate, convergent posteriorly and with few coarse sharp granules, anterior angles broadly rounded, posterior obtuse.... .... *pertenuis* Casey
California (Monterey).

Length 2.7 mm. Piceous, broader linear, ninth joint of antennæ at least as long and broad as tenth; prothorax with side margins strongly sinuate, convergent posteriorly, the marginal granules fine and very densely placed, anterior angles subacute, posterior broadly rounded......................... *linearis* Crotch
California (Santa Inez Mountains).

SUBSECTION B2.

Pronotum with median impression not attaining the posterior margin but with two distinct oval impressions at either side and posterior to it.. SERIES C3

Pronotum with median impression broad, usually attaining the posterior margin, and with two short parallel acute costæ within it posteriorly... SERIES C4

SERIES C3.

Pronotum subquadrate, anteriorly as wide as elytra at base or but faintly narrower........................ .... SUBSERIES D1

Pronotum longer than wide, narrower than elytra, the sides nearly parallel.. SUBSERIES D2

SUBSERIES D1.

Length 3.4–3.7 mm. Interspace 3 elevated from base to near vertex, where it is rather abruptly terminated and replaced by a shining faintly to distinctly punctured area; front of head flattened and faintly punctured, becoming roughly tuberculated towards side margins...................... *apicalis* Casey
California (Santa Cruz County).

Length 3.4 mm. Interspace 3 elevated throughout, sometimes slightly flattened or obsolescent just at the apex; prothorax subconvex, side margins straight, narrowed posteriorly, anterior angles obtusely rounded, posterior rectangular, median impression irregularly suboval, posteriorly a smaller elongate impression at either side, surface densely evenly granulate with indistinct, tortuous, feebly obtusely elevated

costæ; elytra flattened, slightly narrowed towards base, interspaces 1, 3, 5, and 7 obtusely elevated, even interspaces slightly narrower than strial punctures, the latter close set, regular, deep, subquadrate, head with side margins scarcely reflexed, divergent posteriorly, front densely granulate, the granules coarser towards the sides..... .... *schwarzi*, n. sp.
British Columbia (Vancouver).

SUBSERIES D2.

Length 3 mm. Head coarsely densely granulate, prothorax longer than wide, sides nearly parallel and straight, anterior angles rather obtuse, posterior angles sharply rectangular. *vegrandis* Horn
California (Berkeley).

SERIES C4.

Pronotum without distinctly elevated costæ between median impression and the margin.................................... SUBSERIES D3
Pronotum with a distinct costa between median impression and margin.. SUBSERIES D4

SUBSERIES D3.

Length 2 mm. Median impression of pronotum strongly impressed, the hooked-formed elevations on anterior margin distinct, easily traceable.......................... *referendarius* Zimm.
District of Columbia to Florida.

SUBSERIES D4.

Length 3 mm. Punctures of elytra striæ about as wide as even interspaces; pronotum longer than wide, sides very broadly curved and narrowed posteriorly, median impression distinctly impressed, costa between margin of pronotum and margin of median impression strongly sinuate anteriorly, joined in a broad U curve to elevated margin of concavity, surface coarsely evenly granulate.......................... *servus* Horn
California

Length 2.5 mm. Punctures of elytra striæ comparatively large, even interspaces obsolete or nearly so. Body very slender, castaneous, legs and antennæ a little lighter; pronotum a little longer than broad, its sides nearly straight or slightly convergent posteriorly, anterior angles broadly rounded, posterior subrectangular to rounded, a fine, straight, very feebly elevated costa between median impression and margin, median impression suboval, shallow, its margins retuse; extending into the impression for about one-fourth its length are two pairs of acutely elevated lines, the one from the anterior and the other from the posterior margin, the latter pair joined by a transverse curved ridge; surface

densely granulate, coarser in impression, pubescence fine, inconspicuous. Elytra with the sides parallel, interspaces 1, 3, 5, etc., very narrowly, acutely, evenly elevated throughout their length, strial punctures coarse, close set, even interspaces appearing obsolete, the oblique setæ yellowish, exceedingly fine, scarcely perceptible. Head with side margins strongly reflexed, slightly diverging posteriorly, front rather coarsely evenly granulate, with a distinct median tubercle... *simplex* Lec.

Lower California (Cape San Lucas).

Length 2.2 mm. Species stouter, fuscous, legs, and antennæ ferruginous; pronotum longer than broad, narrower posteriorly than elytra at base, side margins straight or feebly arcuate, convergent posteriorly, anterior angles very broadly and the posterior obtusely rounded, median impression broadly impressed, elongate, attaining the anterior margin, two pairs of short acutely elevated costæ extending into it for about one-fourth its length one pair from anterior and the other pair from posterior margin, a feebly elevated sinuous costa between impression and margin, surface densely evenly granulate, coarser in impression, the pubescence, especially on the costæ, silvery and very conspicuous. Elytra noticeably flattened dorsally, parallel, interspaces 1, 3, 5, and 7 equally feebly rather obtusely elevated and finely tuberculated, even interspaces appearing nearly obsolete, finely granulate, each granule bearing a conspicuous seta obliquely inclined posteriorly. Head with side margins strongly reflexed, front densely evenly granulate, with a prominent median longitudinal strongly elevated ridge.
planipennis, n. sp.

Arizona (Grand Canyon Station).

SUBDIVISION D.

Pronotum with a distinct longitudinal elevated costa between the median impression and the lateral margins......... SECTION A5
Pronotum without trace of such costa............................ SECTION A6

SECTION A5.

Length 2 mm. Body stout, pronotum about as wide as long, posteriorly narrower than elytra, sides nearly straight and convergent posteriorly, median impression broad, deep, a pair of very short acutely elevated lines within it at anterior margin and a similar pair very poorly defined or obsolete at anterior margin at either side, a single longitudinal costa between impression and side margin, surface densely evenly covered with sharp setigerous granules, which become coarser and tuberculate within the impression; elytra broad,

narrowed toward base, dorsal area slightly concave, interspaces 1 and 3 about evenly elevated, 5 somewhat more than 3, especially toward apex, the former joins 7, then is strongly angled and curved inward, joins 3, and proceeds to apex, where it joins 9 and 1, a very noticeable character; even interspaces appearing obsolete, strial punctures close set, large, each with a bristle pointed obliquely backward, front of head concave, densely granulate, with prominent median tubercle.. .... *fiskei*, n. sp.
Texas (Montell).

Length 2.3 mm. Body stout, pronotum subquadrate, narrowed posteriorly, side margins broadly evenly arcuate, median impression deep, broad, within it a pair of approximate tubercles close to anterior margin and a pair of acutely elevated parallel lines extending from posterior margin anteriorly for one-fourth the length of the pronotum; at either side an acutely elevated costa, nearly straight from posterior to anterior margin, where it curves inward and joins the marginal tubercle; elytra narrowed anteriorly, strongly concave, interspaces 1 and 3 finely, acutely, evenly elevated from base to apex, 5 greatly elevated, much more than 3, straight to near apex, where it joins 7, is then strongly curved inward, and extends as an elevated ridge to the apex, joining also 3 and 1; even interspaces appearing obsolete, strial punctures dense, close set, coarse, equally distinct throughout, head and the margins strongly reflexed and elevated over the eye; front densely evenly granulate with prominent longitudinal median tubercle. *bitomoides*, n. sp.
Arizona (Flagstaff).

SECTION A6.

Anterior margin of pronotum with two curvate elevations. SUBSECTION B3
Anterior margin without curvate elevations.............. SUBSECTION B4

SUBSECTION B3.

Margins of median impression of pronotum broadly arcuate and slightly converging posteriorly; interspace 3 distinctly elevated from base for at least three-fourths its length... SERIES C3
Margins of median impression sinuate, scarcely or not at all convergent posteriorly; interspace 3 not distinctly elevated beyond its anterior fourth.. SERIES C4

SERIES C3.

Length 2.5–3 mm. Pronotum longer than wide, posteriorly faintly narrower than elytra at base, shining, side margins nearly straight, slightly convergent posteriorly, median impression with a distinct median carina, punctures very fine, simple,

not at the apices of rather coarse tubercles; elytra narrow, faintly more narrowed and concave posteriorly, interspace 1 straight, rather abruptly thickened toward apex, 3 feebly but almost evenly elevated throughout, 5 strongly elevated, more so towards apex, strial punctures small, close set, traceable throughout... *pusillus* Lec.

District of Columbia to Texas.

Length 2.5 mm. Pronotum subquadrate, subopaque, slightly narrower than elytra, side margins broadly arcuate, scarcely converging posteriorly, median impression without median carina, the punctures, however, situated on the summits of coarse, feebly elevated tubercles; elytra rather broad, interspace 1 not at all more thickened towards apex, in most examples less so, 3 distinctly subobtusely elevated throughout, more strongly at base, 5 strongly elevated to near apex, where it is abruptly flattened, strial punctures very distinct, very readily traceable throughout................. *subcostulatus*, n. sp.

Idaho (Centerville).

SERIES C4.

Length 3 mm. Pronotum subquadrate, opaque, scarcely at all rounded posteriorly, but the posterior angles very broadly rounded, median impression very broad, its margins acute, nearly parallel and not attaining either anterior or posterior margin, anterior margin with two curvate elevations, including margins of impression; elytra broad, strongly concave posteriorly and with the base strongly emarginate, interspace 1 feebly evenly elevated to near apex, where it is rather strongly thickened, 3 strongly, sharply elevated at base for about one-fourth its length, then flattened and traceable for about to near apex, where it is confused with 1, 2, and 4; 5 very strongly elevated to near apex, where it is gradually flattened and curved inward to the apex, strial punctures to interspace 5 scarcely visible, striæ appearing as feebly impressed narrow lines......................... *laqueatus* Lec.

Arizona.

SUBSECTION B4.

Length 2.8 mm. Pronotum broader than long, posteriorly slightly narrower than elytra at base, the side margins broadly curved and narrowed posteriorly, median impression very broad, deep, its margins broadly curved, punctures very fine, simple; anterior margin of prothorax without trace of curvate elevations; elytra very broad and concave, interspace 1 just visibly elevated, 3 elevated at base for about one-sixth or one-seventh its length, then flattened, but traceable to apex, 5 strongly acutely elevated from base to

near apex, where it is rather abruptly flattened, strial punctures small, elongate, the striæ appearing as feebly though distinctly impressed lines................................... *concavus* Casey
New Mexico (Las Vegas).

Lasconotus mexicanus, new species.

Type: No. 14185 U. S. N. M. One specimen from the late Dr. E. Dugès, Guanajuato, Mexico.

This species resembles *L. complex* Lec. in many respects, but is readily distinguished by the characters given above. It differs from the other species in the group in having the third interspace not more elevated at the apex than the fifth and by its much smaller size.

L. flexuosus, new species.

Type: No. 14186 U. S. N. M. Hopk.; U. S. No. 2289d1. A single specimen collected by H. E. Burke, at Hoquiam, Washington. A remarkably distinct species somewhat allied to *complex*, but very different in prothoracic structure.

Lasconotus complex Lec. 1859, p. 282.

One of the larger species and the first representative of the genus to be described. Associated with various scolytids in galleries and beneath bark of Monterey and lodgepole pine and Sitka spruce. Represented by some fifty specimens.

Hopk. U. S.—California: Monterey. Utah: Kamas. Washington: Hoquiam, Satsop.

U. S. N. M.—California: Placer County (Hubbard & Schwarz, Koebele). Oregon: Clatsop. Washington: Spokane Falls. Vancouver, British Columbia. Dr. Horn also records Nevada.

Lasconotus tuberculatus, new species.

Type: No. 14187 U. S. N. M., Hopk. U. S. No. 989ad, one of the five collected by J. L. Webb, at Elmore, South Dakota.

Closely allied to *complex* Lec., but easily distinguished by the fact that the inner pair of costæ are interrupted for long distances by flattened areas bearing rather sharp elevations, whereas in the former they are continuous throughout. There is very little variation, except slightly in size. Associated with various scolytids in galleries and beneath bark of *Pinus ponderosa*, *strobiformis*, *Picea engelmanni*, and *Pseudotsuga taxifolia*. More than 90 specimens have been examined.

Hopk. U. S.—Arizona: Chiricahua Mountains, Flagstaff, Santa Catalina Mountains. California: Las Animas County.

Colorado: Beulah, Palmer Lake, San Isabel National Forest. New Mexico: Capitan Mountains, Cloudcroft, Meeks, White Mountains. South Dakota: Black Hills, Custer, Elmore, Lead, Nemo. Utah: Panguitch. Washington: Hoquiam. Wyoming: Hayden National Forest.

U. S. N. M.—Arizona: Chiricahua Mountains.

Lasconotus borealis Horn. (Proc. Amer. Philos. Soc., XVII, 1878, p. 570.)

Medium-sized, slender species, the pronotal structure very similar to *linearis* Crotch, and the elytral structure allied to *flexuosus*, being, however, relatively more convex and the odd interspaces equally elevated throughout. I have seen but four specimens, one bred from spruce infested by *Pityophthorus*, from Grand Island, Michigan. Another taken by Mr. E. A. Schwarz on birch or alder at Marquette, Michigan, which Mr. Schwarz tells me is one of two taken by him at the same time. The other was given to Dr. LeConte. Dr. Horn described it and it is now in the LeConte collection. The fourth is in the Horn collection and is from the White Mountains, New Hampshire.

Lasconotus intricatus new species.

Type: No. 14188, U. S. N. M.; Hopk. U. S. No. 4020-1, one of three specimens collected by Mr. H. E. Burke at Hoquiam, Washington, under bark of *Picea sitchensis*.

This species is very closely allied to *borealis*, but is readily distinguished by its relatively more slender prothorax and much darker color.

Lasconotus nucleatus Casey. 1890, p. 314.

A most remarkable and distinct species. It differs from every other in the genus by its peculiar elytral structure, having none of the interspaces elevated throughout, but instead the odd interspaces are broader, flattened, but interrupted at long distances by small tumid elevations bearing a dense tuft of whitish setæ.

A series of 15 specimens shows very little variation, except very slightly in size and a few examples have the anterior margins of the prothorax more broadly rounded. Mr. Schwarz tells me he collected the specimens on twigs of *Pinus radiata* infested by *Pityophthorus* sp.

U. S. N. M.—California: Eureka (H. S. Barber), Monterey (E. A. Schwarz). Oregon: Astoria (Hubbard & Schwarz).

Lasconotus pertenuis Casey. 1890, p. 313.

The most slender species of the genus, very closely allied to the following, though easily recognized by the antennal structure and much smaller, narrower body and the coarser interruptions of the margins of the prothorax. I have seen but two specimens taken at Santa Cruz Mountains, California, by Mr. A. Koebele, and two in the LeConte collection from California. Colonel Casey's specimens are from Monterey.

Lasconotus linearis Crotch. 1874, p. 75.

This species and the preceding are peculiar in showing a tendency towards color markings on the elytra, which have the base and apex chestnut brown, the remainder dark piceous. Described from material "under" bark of sycamore or small forest tree at the Hot Springs in the Santa Inez Mountains (Crotch). There is very little variation in the series of four specimens examined, except in some the light markings of the elytra are more distinct. They were collected by beating young pine trees. If Crotch's specimens really came from beneath the bark of sycamore it is remarkable.

U. S. N. M.—California: Los Gatos (E. A. Schwarz).

There are also four specimens of this species in the LeConte collection from California.

Lasconotus apicalis Casey. 1890, p. 315.

One of the larger species closely allied to *vegrandis*, but easily separated by the elytral structure and the shape of the prothorax as noted in the synopsis. In this species is seen the beginning of the union of interspaces 5 and 7, which are then prolonged as a single elevation toward the apex, a character which reaches its extreme development in *bitomoides*, and also the reduction of interspace 3, which is most extreme in *concavus*. There is some variation in this species in size and especially the amount of reduction of interspace 3 at the apex. In some specimens the smooth, unelevated area is of considerable extent, perhaps one-third the length of the inter space, while in others it is limited to one-fifth or one-sixth the length. Associated with *Phlœosinus* sp. in 'Cedar' and *Cupressus macrocarpa*.

Hopk. U. S.—California: Monterey.

U. S. N. M.—California: Los Gatos.

Lasconotus schwarzi, new species.

Type: No. 14189 U. S. N. M., collected by Hubbard & Schwarz at Victoria, Vancouver Island.

This species is most closely allied to *vegrandis*, but differs markedly from it, in its larger size, broader, flatter body, and prothoracic structure. A series of 15 specimens showing some variation. Some specimens have the prothorax more narrowed posteriorly, but are otherwise typical. Associated with scolytids in Douglas fir and pine. Named for Mr. E. A. Schwarz, who collected the examples.

Hopk. U. S.—Idaho: Centerville. Washington: Rock Creek.

U. S. N. M.—Vancouver Island (Victoria). Washington: Tenino (Hubbard & Schwarz.)

Lasconotus vegrandis Horn. 1885, pp. 140–141.

This species is readily distinguished from *schwarzi* by its more slender form, the more sharply produced posterior angles of the prothorax and more delicate structure throughout. A series of six specimens showing but little variation. Associated with *Phlœosinus* sp. in *Thuja*.

Hopk. U. S.—California: Wawona.

A single specimen in the Horn collection from California.

Lasconotus referendarius Zimm. 1869, p. 254.

An exceedingly minute, distinct species, easily known from *simplex*, its nearest ally, by the deep median impression of the pronotum and the more distinctly thickened apical margin of the same. A series of some 70 specimens shows very little variation except slightly in size and some have the anterior elevations of pronotum more acute. Associated with various scolytids under bark of *Pinus strobus*, *palustris*, *virginiana*.

Hopk. U. S.—Alabama: Montgomery. District of Columbia: Rock Creek Park. North Carolina: Biltmore, Chadbourne, Hendersonville, Pink Beds, Pisgah Ridge, Tryon. Texas: Deweyville, Kirbyville. Virginia: Richardsville.

U. S. N. M.—District of Columbia (Hubbard & Schwarz, Linell). Florida: Tampa, Crescent City, Biscayne (Hubbard & Schwarz). Georgia: St. Catherine Island. Texas (Belfrage).

Lasconotus servus Horn. 1885, p. 141.

This species is not closely allied to any other; it resembles *referendarius* in elytral characters and the following species in pronotal structure, though in both cases this resemblance is but slight. The wide, flat, even interspaces are a striking character. I have seen but 5 specimens, which are very constant. They occur under bark of yellow pine, associated with *Pityophthorus* sp.

Hopk. U. S.—California: Yosemite Valley.

U. S. N. M.—Arizona: Williams (Barber & Schwarz).

Lasconotus simplex LeConte. 1866, p. 378.

Readily recognizable by its linear form, acute, narrow, equally elevated, odd interspaces of the elytra and the very coarse strial punctures. It is at once separated from *planipennis* by its smaller size, narrower form, shallower pronotal impression, and less conspicuous pubescence. A series of 11 specimens show more than the usual specific variation. Some specimens have the pronotum more narrowed posteriorly, the median impression deeper and nearly attaining anterior margin, and the sculpture stronger throughout. Associated with *Pityophthorus* sp. in *Pinus ponderosa* and *P. strobiformis.*

Hopk. U. S.—Arizona: Santa Catalina Mountains, New Mexico: Cloudcroft.

U. S. N. M.—Arizona: Chiricahua Mountains (Hubbard & Schwarz). New Mexico.

Lasconotus planipennis, new species.

Type: No. 14190, U. S. N. M.; Hopk. U. S., No. 5097. One of eight specimens collected by J. L. Webb at Grand Canyon, Arizona.

The main differences between this species and *simplex* are pointed out under that species. A series of 24 specimens showing some variation, more especially in size and color. Associated with scolytids in *Pinus edulis, murrayana,* and *strobiformis.*

Hopk. U. S.—Arizona: Grand Canyon. California: Delglades. New Mexico: Capitan Mountains. South Dakota: Black Hills, Elmore. Wyoming: Hayden National Forest.

U. S. N. M.—California: Lake Tahoe (Hubbard & Schwarz). New Mexico: Las Vegas Hot Springs (Barber & Schwarz).

Lasconotus fiskei, new species.

Type: No. 14191, U. S. N. M.; Hopk. U. S. No. 3868. One of 12 specimens collected by W. F. Fiske at Montell, Texas. Intermediate between the preceding and the next species. It is smaller and stouter than *simplex*, having elytral characters similar to the following species, but the fifth interspace is less elevated and the dorsal area of elytra is flat, not concave. Associated with *Pityophthorus* sp. in *Pinus edulis.*

In naming this species for Mr. W. F. Fiske I wish to acknowledge the use of the manuscript notes which he had prepared on this genus, and which have been of great assistance on several of the species.

Lasconotus bitomoides, new species.

Type: No. 14192, U. S. N. M.; Hopk. U. S., No. 5018c, collected by J. L. Webb at Flagstaff, Arizona.

A remarkable species resembling in general appearance a *Bitoma*. This species and the preceding show the beginning of the characters of the *pusillus* group, the reduction of interspaces 1 and 3, and the strong elevation of 5. The elevated oblique ridge from interspace 5 to the apex is a striking character and very strongly developed. It is broader and stouter than *fiskei* and at once separated from that species by the concave elytra, also the two small but parallel costæ extending from the posterior margin together with the more distinct median impression. Two specimens; associated with scolytids in *Pinus edulis*.

Hopk. U. S.—Arizona: Chiricahua National Forest, Flagstaff, Santa Catalina National Forest. New Mexico: Capitan, Capitan Mountains.

U. S. N. M.—Arizona, Williams (Schwarz & Barber.)

Lasconotus subcostulatus, new species.

Type: No. 14193, U. S. N. M.; Hopk. U. S. No. 5286b. One of 8 specimens collected by J. L. Webb at Centerville, Idaho.

This species and *pusillus*, though closely allied, are distinct and readily separated by the characters outlined in the synopsis above. The slender form, more elevated first and third interspaces, less concave elytra, broad median impression of the prothorax, and its peculiar punctation, serve to separate it at once from *laqueatus*, with which it has been confused. See also under *laqueatus* below. A series of a hundred specimens, all remarkably constant, slight variation in size, a few have the strial punctures more marked, but they are very distinct in all. In *Pinus pondorosa*, *monticola*, *murrayana*, and *Picea sitchensis*, associated with scolytids.

Hopk. U. S.—California: Summerdale, Yosemite Valley. Colorado: Boulder. Idaho: Centerville, Kootenai. Montana: Missoula. Oregon: Grant's Pass. South Dakota: Black Hills, Elmore, Lead. Washington: Buckeye, Hoquiam.

U. S. N. M.—California: Placer County, Sacramento (Hubbard & Schwarz, Koebele). Nebraska: Pine Ridge (Soltau). Oregon: Hood River. Washington: Spokane Falls (Hubbard & Schwarz).

Lasconotus pusillus LeConte. 1863, p. 57.

Closely allied to the preceding, but very distinct, as outlined under *laqueatus*. LeConte gives "Southern States,

Georgia and South Carolina." A series of 40 specimens varying but little among themselves. Associated with various scolytids in *Pinus palustris, virginiana, ponderosa.*

Hopk. U. S.—Georgia: Clyo. North Carolina: Boardman, Tryon. Texas: Call, Deweyville.

U. S. N. M.—Florida: Biscayne, Palatka, Tampa (Hubbard & Schwarz). Nebraska: Pine Ridge (Soltau.)

The distribution as given by Dr. Horn includes also *laqueatus* and *subcostulatus.*

Lasconotus laqueatus LeConte. (Proc. Acad. Nat. Sci. Phila., 1866, p. 378.)

This species is intermediate between *pusillus* and *concavus*, resembling the former in its somewhat elongate form and the hook-shaped elevations on anterior margin of prothorax, and the latter in the broad thoracic impressions and elytral structure, except interspace 5 is not so strongly elevated, the strial punctures are more readily traceable, and the prothoracic impression narrower.

There has been considerable confusion in regard to this species, *subcostulatus*, and *pusillus*. Dr. LeConte (1865) based his description on material from Dr. Elliott Coues, Arizona. The specimen now bearing the name label in the LeConte collection agrees precisely with the original description, but in the same series are five other specimens labeled "Or." These specimens are all typically *subcostulatus* and totally different from the true *laqueatus*. In the Horn collection I find that Dr. Horn has placed representatives of all these species under *pusillus*. Among them are 2 specimens of *laqueatus*, 1 from Pinal Mountains, Arizona, and the other from Montana; 7 specimens of *subcostulatus*, 2 of which are from Montana, 4 from Nevada, and 1 from Washington; and 2 specimens of *pusillus*, one of which, bearing the name label, is from Georgia, the other from Florida. Dr. Horn's (1878) description of the unnamed specimens from Vancouver applies precisely to *subcostulatus*, as do also all the characters assigned by Col. Casey (1890) to *laqueatus*. The range of *subcostulatus* is northward and of *laqueatus* southward from southern Montana and southwestern South Dakota. I have specimens of both species from Colorado (Boulder), South Dakota (Black Hills), and Nebraska (Pine Ridge), and in the Horn collection from Montana.

A series of 15 specimens showing some variation, more especially in width. Found associated with scolytids under bark of *Pinus ponderosa.*

Hopk. U. S.—Colorado: Boulder. New Mexico: Capitan, Meeks. Texas: Davis Mountains.

U. S. N. M.—Nebraska: Pine Ridge (Soltau).

Lasconotus concavus Casey. 1890, pp. 315–316.

A robust species showing the extreme development of the characters of the *pusillus* group. Interspace 1 is just visibly elevated, 3 elevated at base for about one-sixth its length, and 5 very strongly elevated from base to near apex; the strial punctures are just traceable. The prothoracic impression is very broad, with punctures fine and simple. A series of about 125 specimens. Commonly associated with scolytids in *Pinus ponderosa* and *strobiformis*.

Hopk. U. S.—Arizona: Chiricahua National Forest, Flagstaff, San Francisco Mountains, Williams. Colorado: Mancos. New Mexico: Capitan, Capitan Mountains, Meeks, Vermejo.

U. S. N. M.—Arizona: Chiricahua Mountains (Hubbard & Schwarz), Bright Angel, Williams (Schwarz & Barber). New Mexico: Las Vegas Hot Springs (Schwarz & Barber).

Lasconotus atomus Grouvelle. 1908, p. 49.

I have not seen a specimen, but it is apparently distinct from any of the species occurring in the United States. I quote the following from Grouvelle's description:

Elongate, parallel, moderately convex, feebly shining, ferruginous, a little smoky; antennæ, except the club, and the legs more reddish. Antennal club smoky, first segment narrower than the two following. Head granulate, wider than long at the level of the eyes, sides straight, converging anteriorly, anterior margin rounded, on the disc five impressions somewhat confluent, two anteriorly and three in line on the summit of the head. Prothorax granulate, the form of an inverted trapezoid, just about as long as wide anteriorly, anterior margin rounded, feebly sinuous at the extremities, sides nearly straight, finely margined and crenulate; base truncate, strongly excavated at the extremities; anterior angles feebly produced anteriorly, rounded, posterior almost right, well marked; at the middle of the disc a longitudinal furrow well marked anteriorly, and at each side of the furrow, two longitudinal carinæ; the internal less accentuated, divided anteriorly and posteriorly into two short carinæ, the external well marked, entire, flexuose. Scutellum puncture-like. Elytra parallel, a little less than 3 times as long as wide, when taken together; each with three sensibly equal discoidal carinæ, the first attaining the apical margin of the elytra, the two others united before attaining that margin, intervals between the carinæ with two lines of large punctures.

In the young decayed branches of *Clusia rosea* and *Atrocarpus*. Guadeloupe, West Indies.

From the description it seems somewhat allied to *mexicanus*. If this species is a true *Lasconotus* it is remarkable that it should be found in the decaying branches and especially of the above-named trees, both of which are non-coniferous.

Lasconotus sulcifer Sharp. 1894, p. 464.

I have not seen a specimen. I quote the following from Dr. Sharp:

Antennæ with joints 3 to 8 quite small, the 3-jointed club large and abrupt. Head deeplv and broadly impressed. Thorax longer than broad, finely margined at the sides, delicately punctate and pubescent, with a broad depression along the middle, limited on each side by an obtuse costa; these costæ do not reach quite to the front margin, but they are each surrounded at the end by a slight curvate elevation; the extreme base of the thorax is strongly constricted, the true hind angles being thus concealed. The elytra have the shoulders prominent in front; they are broadly and deeply longitudinally depressed along the middle; the suture is scarcely costate in front, but is distinctly so towards the apex; the first interstice is feebly costate, but only on the basal portion; the third interstice limits the broad depression and is strongly costate, and outside it there is also another costa, strongly raised and extending from the base to the apex; the intervals bear obscure serial punctures.

Closely allied to *L. pusillus* Lec., but narrower, with the shoulders more prominent anteriorly, the elytral depression much more marked, and the costæ more sharply elevated. We have received nearly 20 examples; they vary in color, some being brownish, but in other respects are very constant.

Guatemala, San Geronimo (Champion).

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A NEW MICROLEPIDOPTERON OF THE GENUS EPICALLIMA DYAR FROM PENNSYLVANIA.

By AUGUST BUSCK.

Epicallima lucidella, new species.

Labial palpi golden yellow. Antennæ velvety black with silvery white tips; basal joint smooth without pecten. Face, head and thorax bronzy. The deep black ground-color of the forewings occupies but a small part of the wing as a margin on the base, along dorsum and around the apical edge to the brilliant deep golden-yellow area which occupies the larger costal half of the wing and sends a long process out towards the apex; at basal third is a narrow perpendicular black-edged metallic blue fascia, crossing the golden area and terminating in a pale yellow dorsal spot; on the cell are two pairs of paralel longitudinal metallic blue streaks, all edged with black; on the middle of costa is a small pale yellow spot and at apical third is a similar pale costal dash. Cilia blackish with strong golden reflexions. Hind wings and abdomen black. Legs black, with the tips of the tarsi and the spurs silvery white.

Alar expanse: 12-13 m.m.

Habitat: Oak Station, Allegheny County, Pennsylvania. (Fred Marloff, collector.)

Type: No. 14435, U. S. Nat. Mus.

A brilliant species suggesting some of the European metallic species, but very different in pattern. Among the American species it comes nearest the smaller *edithella* Busck, from which, however, it is also amply differentiated in pattern.

A READJUSTMENT OF MUSCOID NAMES.

BY CHARLES H. T. TOWSEND.

In these days dipterological nomenclature is getting a severe shaking up, and the Muscoidea come in for their share. The late resurrection of Meigen's 1800 paper, the recent discovery of various long-perpetuated nomenclatural errors as judged by the rules of the International Code, and the designation of certain genotypes by the late Mr. D. W. Coquillett call for a considerable amount of change in the names of muscoid genera, tribes, subfamilies, and in one notable case a change of family name. These changes are detailed below so far as they are apparent to me at this time.

FAMILY PHASIIDÆ.

SUBFAMILY PHASIINÆ.

TRIBE PHASIINI.

1. **Phasia** Latr. (1804).

Type: Syrphus hemipterus J. C. Fab., being the only species given by Latreille, as *Thereva coleoptrata* J. C. Fab., which is a synonym of the above, according to Bezzi and Stein.

Syn.: Alophora R. D. (1830), Girschner et al., which has the same type.

Repr. habit: Subcutaneous oviposition (Pantel, Towns.).

This compels dropping of *Alophora*, which will hereafter be known as *Phasia*, and likewise changes the meaning of the tribal and subfamily names derived from *Phasia*.

2. **Hyalomyia** R. D. (1830).

Type: Phasia pusilla Meig., being designation by Westwood in 1840.

Syn.: Parallophora Girsch. (1888), which has same type.

Repr. habit: Unknown, but judged same as *Phasia*.

This compels dropping of *Parallophora*, hereafter to be known as *Hyalomyia*.

3. **Alophorella,** gen. nov.

Type: Thereva obesa J. C. Fab., hereby designated.

Syn.: Hyalomyia Girsch. (1888) et al. (nec. R. D.).

Repr. habit.: Subcutaneous oviposition (Pantel).

This and 2 call for a complete shift of the name *Hyalomyia*, hereafter to carry a different meaning.

SUBFAMILY ECTOPHASIINÆ.

TRIBE ECTOPHASIINI.

4. **Ectophasia**, gen. nov.

Type: Syrphus (Thereva) crassipennis J. C. Fab. (female equals *T. analis* J. C. Fab.), hereby designated.

Syn.: Phasia Auctt. (nec Latr.).

Repr. habit. Host-oviposition of flat macrotype egg (Pantel et al.).

This and 1 call for a complete shift of the name *Phasia*, which hereafter carries a totally different significance.

NOTE.—Bezzi and Stein indicate *Eratia occlusa* R. D. (1863) as synonym of above genotype. The description appears to me incompatible with specimens of *crassipennis* but conforms much better to those of *Elomya lateralis* Meig., whose abdominal spots show moreover a tendency toward the trigonal pattern. In the non-existence of Desvoidy's types and improbability of the above synonymy I do not consider the name *Eratia* available for use here.

TRIBE RHODOGYNINI.

5. **Rhodogyne** Meig. (1800).

Type: Musca rotundata L., being the only species given by Meigen with his *Gymnosoma* (1803), which is manifestly the same genus, according to Hendel.

Syn.: Gymnosoma Meig. (1803).

Repr. habit: Host-oviposition of flat macrotype egg (Pantel, Towns, et al.).

This calls for the dropping of *Gymnosoma* and its derivative names, euphonious and long in use.

FAMILY MUSCIDÆ.

SUBFAMILY MESEMBRININÆ.

TRIBE MESEMBRININI.

6. **Mesembrina** Meig. (1826).

Type: Musca meridiana L., being designation by Westwood in 1840.

Syn.: Metamesembrina Towns. (1908), which has same type.

Repr. habit: Dung-larviposition, maggot apparently being carried through at least first stage in utero (Portchinski).

7. **Hypodermodes**, gen. nov.

Type: Musca mystacea L., hereby designated.

Syn.: Mesembrina Towns. (1908), (nec Meig.).

Repr. habit: Dung-oviposition of few large eggs, the maggot omitting its second stage (Portch.).

This and 6 call for shift of *Mesembrina* from meaning given in Tax. Musc. Flies (1908).

SUBFAMILY MUSCINÆ.

TRIBE STOMOXYDINI.

8. **Hæmatobia** St. Farg. & Serv. (1828), R. D. (1830).

Type: *Conops irritans* L., being designation by Westwood in 1840.

Syn.: *Lyperosia* Rdi. (1856–1862), which has same type.

Repr. habit: Dung-oviposition (Riley & Howard).

Calls for dropping of *Lyperosia* and reinstatement in the economic literature of the generic name, *Hæmatobia* for the horn-fly.

9. **Lyperosiops** gen. nov.

Type: *Stomoxys stimulans* Meig., hereby designated.

Syn.: *Hæmatobia* B. B. et Auctt. system. (nec St. Farg. & Serv., nec. R. D., nec Auctt. econom.).

This and 8 call for shift of *Hæmatobia* from its former significance.

FAMILY EXORISTIDÆ.

SUBFAMILY EXORISTINÆ.

TRIBE EXORISTINI.

10. **Exorista** Meig. (1803).

Type: *Musca larvarum* L., being the only species.

Syns.: *Tachina* Auctt. (nec. Meig., nec. B. B.); *Eutachina* B. B. (1889–1893).

Repr. habit: Host-oviposition of flat macrotype egg (Towns., Pantel, et al.)

This and 19 compel the dropping of the name *Tachina* and its derivatives, names which are probably the most familiar next to *Musca* in the whole superfamily. This, by far the largest family of the Muscoidea, will hereafter be known as the EXORISTIDÆ instead of the Tachinidæ. I hereby designate *Musca larvarum* Linné (*Exorista larvarum* L., Meig., 1803) the type of the family as the form most appropriate to discharge this function. Some may consider *Musca grossa* L. (*Larvævora grossa* L., Meig., 1800–1803) entitled to the honor, as being the original *Tachina*, but I believe that usage, propriety and still other considerations call more loudly for the above designation.

NOTE.—In this connection a word may be said on the classification of Girschner, followed by Bezzi and Stein, which groups nearly all of the Muscoidea in the single family heretofore called Tachinidæ and hereafter to be known as Exoristidæ, the comparatively small remnant of *Musca* and its allies being thrown into the Anthomyiidæ. From a

purely nomenclatural point of view, if the genera *Musca* and *Anthomyia* are placed together in any group from family down, that group should clearly take its name from *Musca*. The genus *Musca* dates from the beginning of zoological nomenclature (1758). *Anthomyia* goes back only to 1803.

From a taxonomic point of view, the consensus of anatomical and reproductive characters allies *Musca* and its kindred much more closely with *Calliphora* than with *Anthomyia*. It seems quite incompatible with evident relationships and phylogenies to separate *Musca* and its allies from the group *Tachinidæ* of Girschner.

Subfamily PSEUDODEXIINÆ.

Tribe MACQUARTIINI.

11. **Paraporia,** nom. nov.

For *Neaporia* Towns. (1908) preocc. by Gorham in Coccinellidæ (1897).

Type: *Aporia quadrimaculata* Macq.

Syns.: *Aporia* Macq. (1846) preocc.; *Neaporia* Towns. (nec. Gorham).

Repr. habit.: Unknown, but judged larviposition near host.

Tribe OCYRTOSOMATINI.

12. **Ocyrtosoma** nom. nov.

For *Cyrtosoma* B. B .(1891–1893), preocc. by Walker in 1829.

Type: *Cyrtosoma rufum* B. B.

Syn.: *Cyrtosoma* B. B. (nec Walk.).

Repr. habit: Unknown, but judged larviposition near host.

Subfamily PHANIINÆ.

Tribe CYLINDROMYIINI.

13. **Cylindromyia** Meig. (1803).

Type: *Musca brassicaria* J. C. Fab., being the only species.

Syn.: *Ocyptera* Latr. (1802-1805).

Repr. habit: Host-larviposition (Towns).

This change gives us new names for the long-familiar and euphonious *Ocyptera* and its derivatives, which must be dropped.

Note.—Latreille appears to have given the generic name *Ocyptera* in 1802 with no species, but in 1804-1805 gave three species with it including the above, without designating a type. Curtis designated above genotype for *Ocyptera* in 1837.

In the light of our present knowledge this tribe appears to form a natural division of the subfamily Phaniinæ. I employ

Phania as the type of the subfamily, following Brauer & von Bergenstamm, notwithstanding Robineau-Desvoidy's earlier use of *Ocyptera* as the type of the group, since *Phania* is far more typical of the group as a whole and *Ocyptera* and its derivatives are now dropped. The subfamily is characterized in general by a great or considerable development of the female genitalia and presumably in most cases for the purpose of subcutaneous larviposition or perhaps oviposition originally. I place the Compsilurini here, and probably most if not all of the forms having the habit of subcutaneous larviposition will eventually be found to belong here. The group seems to bear a considerable affinity to the subfamily Phasiinæ, which has a corresponding development of the female genitalia for the purpose of subcutaneous oviposition. The Phasiinæ are in turn allied with the Conopidæ on the same character, though much differentiated from them in others. I can not follow Bezzi and Stein in grouping *Cylindromyia* with the Pseudodexiine and Pyrrhosiine stocks.

TRIBE EUTHERINI.

14. **Imitomyia,** nom. nov.

For *Himantostoma* H. Loew (1863), preocc. by Agassiz, in 1862.

Type: *Himantostoma sugens* H. Lw., the only species.

Syn.: *Himantostoma* H. Lw. (nec Agassiz).

Repr. habit: Unknown, but judged larviposition.

SUBFAMILY ERYCIINÆ.

TRIBE CROCUTINI.

15. **Crocuta** Meig. (1800).

Type: *Musca geniculata* DeG., being only species given by Meigen in 1803, as *Stomoxys minuta* J. C. Fab. (by error appearing *irritans*), for his *Siphona*, which is the same genus according to Hendel.

Syns.: *Siphona* Meig. (1803); *Bucentes* Latr. (1809).

Repr. habit: Host-larviposition (Pantel et al.).

This compels dropping the time-honored name *Siphona* and its derivatives.

TRIBE ERYCIINI.

16. **Huebneria** R. D. (1847).

Type: *Tachina affinis* Fall., being designation by Robineau-Desvoidy in 1863 of *Carcelia nigripes* R. D., which is a synonym of the above genotype according to Bezzi and Stein.

Syn.: *Exorista* Auctt. p. p. (nec Meig., nec B. B.).

Repr. habit: Host-larviposition (Pantel).

This resurrects one of Robineau-Desvoidy's generic names for a type whose reproductive status is known.

NOTE.—The emendation of *Hubneria* to *Huebneria* is permissible under the rule of the International Code applying to manifest typographical errors.

TRIBE VORIINI.

17. **Voria** R. D. (1830).

Type: *Tachina ruralis* Fall., being the only species.

Syn.: *Plagia* Meig. (1838), for which Róndani designated in 1856 *Tachina verticalis* Meig., which is a synonym of above genotype according to Bezzi and Stein.

Repr. habit: Host-larviposition (Pantel, Towns.).

This drops *Plagia* and its derivatives, euphonious names.

SUBFAMILY HYSTRICIINÆ.

TRIBE ERNESTIINI.

18. **Ernestia** R. D. (1830, Myod. p. 60).

Type: *Tachina rudis* Fall., being the only speeies, as *Ernestia microcera* R. D., which is a synonym of the above genotype according to Bezzi and Stein.

Syn.: *Panzeria* R. D. (1830, Myod. p. 68), (nec Meig., 1838), with *Panzeria lateralis* R. D. the only species, which is same as above genotype according to Bezzi and Stein.

Repr. habit: Leaf-larviposition (Towns., Pantel).

This drops *Panzeria* and its deratives.

TRIBE LARVÆVORINI.

19. **Larvævora** Meig. (1800).

Type: *Musca grossa* L., being designation by Wachtl in 1894 for *Tachina* Meig., which is same genus according to Hendel.

Syns.: *Echinomyia* Duméril (1801–1823), Latr. (1805); *Tachina* Meig. (1803), B. B. (1889), (nec Auctt.).

Repr. habit: Leaf-larviposition (Towns., Pantel).

This drops *Echinomyia* and its derivatives, euphonious and time-honored names.

SUBFAMILY MASICERATINÆ.

TRIBE STURMIINI.

20. **Ugimyia** Rdi. (1870).

Type: *Ugimyia sericariæ* Rdi., the only species.

Syn.: *Crossocosmia* Mik (1890), with same genotype.

Repr. habit: leaf-oviposition of microtype egg (Sasaki, Towns.).

This drops *Crossocosmiu*, which has been in use since 1890.

NOTE.—Bezzi and Stein call Róndani's names, both generic and specific, nomina nuda in effect, stating that they are without description. This does not appear to be so. I have not access at this time to the original publication, but Mik's paper indicates that Róndani described the larva and puparium in a way which by the rules of the International Code is sufficient for the founding of either genus or species, provided only that the form referred to be unmistakably indicated. No one has the slightest doubt as to the identity of either the species or genus referred to by Róndani under the above binomial. If Róndani gave no description of any stage, then Cornalia's description and figure, however poor, fulfils the provisions of the Code as such, since they carry no doubt of the identity of the form referred to. Hence the binomial holds in any event.

It should be stated here that Meinert accepted Sasaki's observations as to the leaf-oviposition habit at the time. It would appear that Róndani did so likewise in his founding of the new genus.

TRIBE NEOPALINI.

21. **Neopales** Coq. (1910).

New name for *Pales* R. D. (1830), (nec Meig., 1800), whose type is *Tachina pavida* Meig. (nec Illig.), according to the synonymy given by Bezzi and Stein.

Syn.: *Pales* R. D. (nec Meig.), the name having been used by Meigen in 1800 for a tipulid.

Repr. habit: Leaf-oviposition of microtype egg (Towns.).

This drops the name *Pales* from the Muscoidea.

TRIBE EPIMASICERATINI.

22. **Epimasicera,** gen. nov.

Type: *Tachina westermanni* Zett., which Bezzi and Stein state equals *Tachina mitis* Meig., hereby designated.

Syn.: *Exorista* Auctt. p. p. (nec Meig., nec B. B.).

Rep. habit: Leaf-oviposition of microtype egg (Pantel).

This generically places another form whose reproductive habit we know.

NOTE.—This species is not referable to any of Robineau-Desvoidy's genera, nor to any other previously erected genus so far as I can find. Brauer and von Bergenstamm referred it (*mitis* Meig.) to their *Parexorista*, which it cannot be. *Eusisyropa blanda* O. S., which they also referred to their *Parexorista*, I believe does not possess a microtype egg, though a form with exceedingly similar external characters does possess such egg. *Exorista futilis* O. S. possesses the microtype egg and was referred to *Parexorista* by Brauer and von Bergenstamm. It may belong to *Epimasicera*.

TRIBE SALMACIINI.

23. **Salmacia** Meig. (1800).

Type: *Musca capitata* DeG., being designation by Curtis in 1835 for *Gonia* Meig. (1803), which is the same genus according to Hendel.

Syn.: *Gonia* Meig. (1803).

Repr. habit: Leaf-oviposition of microtype egg (Towns., Pantel).

This drops the familiar *Gonia* and its derivatives, euphonious names in use for over a century.

FAMILY DEXIIDÆ.

SUBFAMLY DEXIINÆ.

TRIBE CALIRRHOINI.

24. **Calirrhoe** Meig. (1800).

Type: *Stomoxys siberita* J. C. Fab., being only species given with *Prosena* St. Farg. & Serv. (1828), which is same genus according to Hendel.

Syn: *Prosena* St. Farg. & Serv. (1828).

Repr. habit: Unknown, but judged larviposition in vicinity of host.

This drops the long-familiar *Prosena* and its derivatives.

FAMILY SARCOPHAGIDÆ.

SUBFAMILY MILTOGRAMMINÆ.

TRIBE METOPIINI.

25. **Neowinnertzia,** nom. nov.

For *Winnertzia* Schiner (1861), preocc. by Róndani in 1860.

Type: *Metopia mesomelæna* H. Loew, hereby designated.

Syn.: *Winnertzia* Sch. (nec Rdi.).

Repr. habit: Unknown, but judged to be larviposition from double-sac uterus.

NOTE.—I am aware that Bezzi and Stein recognize *Winnertzia* Sch. as a synonym of *Mesomelæna* Rdi. I here record my strong disapproval of duplicate binomials.

26. **Taxigramma** Macq. (1849).

Type: *Miltogramma heteroneura* Meig., being on authority of Bezzi and Stein the same as *Taxigramma pipiens* Perris (1852), the only species.

Syn.: *Heteropterina* Macq. (1854), with above genotype as only species.

Repr. habit: Unknown, but judged to be larviposition from double-sac uterus.

This causes the abandonment of *Heteropterina* as a name.

FAMILY ŒSTRIDÆ.

SUBFAMILY ŒSTRINÆ.

TRIBE ŒSTRINI.

27. **Cephalopsis** gen. nov.

Type: *Œstrus maculatus* Wied., hereby designated.

Syn.: *Cephalomyia* Auct. (nec. Latr.).

Repr. habit: Larviposition in nostrils of ruminants (camels and buffalo in North Africa).

This compels the dropping of *Cephalomyia*, which has served as a generic name for nearly a century, in spite of its having had during most of that time the same genotype as *Œstrus*.

NOTE.- Latreille gave the single species *Œstrus ovis* L. with his genus *Cephalemya* in 1818. Curtis designated the same species in 1826 as the type of *Œstrus* Linné (1758), apparently after all the original Linnean species of *Œstrus* had been abstracted to serve as types of the various genera, the greater part of them having been taken by Latreille.

With these obsequies we bid adieu to the buried names, thanking Mr. Friedrich Hendel, of Vienna, for his part in the matter.

PIURA, PERU, *December 31, 1911.*

A NEW MEGALOPYGID FROM FRENCH GUIANA.

BY WILLIAM SCHAUS.

Mesoscia anguilinea, new species.

Essentially like *M. eriophora* Sepp, but the white submarginal area is straight and narrow, sending a projection along vein 2 to the cell.

Type: Male, No. 12530, U. S. Nat. Mus., St. Jean, Maroni River, French Guiana, April, 1904.

This should have been described in my paper on new species from the Guianas, published in Proceedings of the United States National Museum in 1905, but was omitted therefrom.

DESCRIPTIONS OF THE LARVÆ OF SOME LEPIDOPTERA FROM MEXICO.

By Harrison G. Dyar.

The following larvæ have been obtained by the Bureau of Entomology from Mr. W. Gugelmann, bred by him at Misantla, State of Vera Cruz, Mexico.

PAPILIONIDÆ.

Papilio belesis Bates.

Larva.—Head rounded, slightly bilobed, shining black, with pale secondary hairs on the lower parts of the sides. Body subcylindrical, uniform; a subdorsal row of short papillæ. Black; a large white dorsal saddle on joints 8 and 9, incised before, the points running down to the spiracle on joint 8; two rows of round red spots, stigmatally and subventrally.

Food plant: Anona.

NYMPHALIDÆ.

Gynæcia dirce Linnæus.

Larva.—Head strongly bilobed, each lobe with a long apical horn with short, irregular branches; head shining black, with several small inconspicuous horns especially laterally, all these as well at the large apical horn, pale yellow. Body cylindrical, tapering only slightly at the ends; rows of spinose processes, each process with a straight shaft and three or four branches, collected into a subapical crown; joints 2 has only a small subdorsal process; on joints 3 and 4 are two rows, subdorsal and lateral; on 5 to 12, three rows; on joint 13, a subdorsal pair only; all the processes paired. Body black, the processes contrasting light yellow; laterally on each segment anteriorly an oval dale yellow patch, small on joints 2 to 4, large on 5 to 12, none on joint 13.

Eunica modesta Bates.

Larva.—Head angularly bilobed, roughened with conical secondary tubercles bearing pale setæ; pale orange color, a broad black band across the mouth, with irregular upper border, reaching nearly to the apex of clypeus. Body cylindrical, slender, a little enlarged at joint 12 and the sides of joints 3; at the enlargements are low, degenerate processes, a dorsal cone with short branches and a subdorsal pair on joint 12, a collection of lateral tubercles on joint 3, these colored black. Elsewhere no processes are developed, but the body is roughened with scattered black secondary tubercles, bearing rather long dark setæ, and arranged in transverse lines. General color dull or-

ange with a lateral black band, which widens into a patch covering the spiracle; a large cone laterally in this patch. Feet and leg-shields black.

Food plant: Zanthoxylum pentamon.

HESPERIIDÆ.

Thymele fulgerator Watch.

Larva.—Head large, roundly flattened before, with a slight vertical notch; densely covered with fine secondary hairs, which become long on the vertex; dark brown, the clypeus black, the lobes with vertical pale streaks, somewhat divergent above and confluent towards the clypeal sutures. Neck very small; joint 2 small, with a shining black dorsal shield; body enlarged posteriorly, subcylindrical, stout, tapering a little at the anal end. The skin is covered with rather long white secondary hairs, somewhat sparsely placed. Color black above, with large yellow spots, two on a segment, the anterior one very large, the posterior one small, transverse and paler yellow. The spots begin on joint 3, but are small; large and of nearly equal size on the abdomen; only one on joint 13, rather small. Area below the spiracles crimson, darker on the abdominal feet. Thoracic feet black.

SATURNIIDÆ.

Automeris leucane Hübner.

Larva.—Head larger than joint 2, flat before, rounded above, not bilobed; shining black, shagreened, with a few short, inconspicuous secondary setæ. Body cylindrical, tapering before and abruptly behind; coal-black, a little wrinkly-shagreened and with a few sparse pale secondary hairs; spines light yellow. The spines are in four rows on joints 2 to 5; five rows on joint 6; three rows on joints 7 to 10; four rows on joint 12; a single dorsal and three other rows on joints 13 and 14. The spines are rather short, each with several long branches, tipped with small black points; the two upper rows of joints 2 and 3 are rather longer than the others, as are also the dorsal ones of 13 and 14; the subventral ones are small. Feet and leg-shields shining black.

Food plant: Troena.

ARCTIIDÆ.

Arachnis aulea Geyer.

Larva.—Head rounded, flat before, slightly bilobed, shining black with long black primary setæ; median suture, epistoma and bases of antennæ pale. Body cylindrical, tapering slightly anteriorly, purplish black, darker in the centers of the segments. Warts large, normal, equal, dull red, but not contrasting, bearing dense, short, stiff, spiny black hairs. Feet black; leg-shields deep brown.

HYPSIDÆ (PERICOPIDÆ).

.**Pericopis lycaste** Klug.

Larva.—Head larger than joint 2, rounded, scarcely bilobed, a little wider than high, with primary setæ; shining brown, a blackish shade on each lobe below next to the clypeus; median suture, epistoma, and bases of antennæ pale. Body cylindrical, the feet large. Warts large, iv rather smaller than the others, but i about as large as ii; one large wart only on joints 3 and 4 above the stigmatal wart. Hairs dense, fine, silky brown, rather long and longer at the extremities. Dull brown, shaded with blackish, especially in obscure dorsal, lateral, and stigmatal lines, this marking largely an effect of the darker spaces between the dull pale reddish warts. Joint 4 is lighter throughout. joints 5 and 11 are dark, their warts largely black; joint 12 is a little light also, while 3, 6, and 13 are somewhat darkened, giving the dark and light banded effect usual in the pericopid larvæ, although here the contrast is not marked. Feet and leg-shields dark brown.

NOCTUIDÆ.

Bolina comprehendens Walker.

Larva.—Head smaller than joint 2, rounded, scarcely bilobed, the clypeus rather high; whitish with numerous small black spots; primary hairs rather long, pale. Body cylindrical, long and slender, looped up a little at joints 5 to 7, the feet of joint 7 small, unused; tubercles and setæ reduced, invisible. Coloration a general bark-like effect; dull whitish gray with a reddish brown tint, especially through the dorsum; a subdorsal black line, waved, being bent inward at the segmental incisures, somewhat broken posteriorly, forming a dot on joint 12. A geminate powdery and broken lateral band; a red-filled substigmatal band; bases of the feet mottled with white and with white patches around the spiracle of joint 12. Between these markings the skin is dotted with black and red. Feet concolorous in general effect, dotted and with a red line anteriorly.

EUPTEROTIDÆ.

Zanola verago Cramer.

Larva.—Head rounded, flat before, the clypeal sutures impressed; covered with rather long black secondary hair; gray-black, dull, the clypeus shining, its sutures pale; a broad pale band covering the median suture. Body cylindrical, uniform; subdorsal and lateral narrow yellow lines infiltrated with red; an irregular double wavy dorsal line; skin ocvered with secondary hairs, about half as long as the diameter of the body, dark colored, but not black; tufts of long black hairs subdorsally on joints 3, 4, and 12, the longest of them with their tips widened into flat triangular scales with serrated tips; other black hairs, not form-

ing tufts, along the body from the larger of the primary warts; warts low, concealed and confused in the secondary hair. Thoracic feet light red-brown; abdominal ones dull vinous.

The larva has the structure of the genus *Apatelodes* Packard, which has been placed in the Eupterotidæ The group is also relaeed to the Notodontidæ, and has been more generally included in that family.

LIPARIDÆ.

Turenna dirphioides Walker.

Larva.—Head large, rounded, slightly bilobed; clypeus small; whitish brown, scarcely mottled, more white shaded over the clypeus; white secondary hairs are numerous on the lower part of the side. Body somewhat flattened, uniform, the feet slender and rather long; lateral wart of joint 2 large; three small warts above the stigmatal wart on joints 3 and 4; on the abdomen warts i and ii equal, rather small, tending to lie in line, iii and iv closely approximating, functionally one large wart, v and vi also somewhat approximated and nearly in line, appearing as one, leg shields densely hairy. Small whitish retractile tubercles dorsally on joints 10 and 11. Coloration whitish brown; a black line on the large wart on joint 2; a square black dorsal patch between 3 and 4; an oblique subdorsal bar on 8, somewhat powdery and broken; an oblique lateral line on 11-12; ordinary markings obsolete, the skin a little mottled and a narrow geminate blackish dorsal line. Hairs abundant, from the warts only, whitish, short dorsally, much longer laterally. Feet all pale.

The larva is flattened and with long lateral hairs and bark-like coloration, superficially much resembling a lasiocampid like *Tolype*. The structure, however, is normal for the Liparidæ.

Food plant: *Psidium*.

LASIOCAMPIDÆ.

Tachyptera psidii Sallé.

Larva.—Head large, rounded, flattened before, slightly bilobed; black, brownish at the sides, the clypeus and paraclypeus as well as median suture narrowly pale; numerous dark secondary hairs throughout. Body cylindrical, tapering a little posteriorly; black, without markings; hair all secondary, dense but short, foxy red, arranged in little patches; dorsal hair mostly directed upward and slightly keeled along the dorsal line; lateral hair projecting outward or downward. Warts all obsolete, only a trace of a lateral projection on joint 2.

Food plant: *Psidium*.

Claphe maria Schaus.

Larva.—Head moderate, round, scarcely bilobed, black with gray pruinosity; a yellowish white line across from bases of antennæ; labrum yellowish white: median suture narrowly pale; densely covered with white secondary hairs. Body cylindrical, uniform; dorsum black; a lateral yellow line, from which transverse yellow bands traverse the dorsum, one on each segment behind the middle, some broad and distinct, some narrow or obsolete; the one on joint 7 is the most distinct; those on 3, 4, and 9 are next, the others being quite narrow or even obsolete. Lateral region dark gray, with a pale diffused substigmatal line. Warts obsolete dorsally, only the subventral lappet-warts visible, fairly prominent, two warts present on joint 2. Secondary hairs fine, short, white, with longer white ones from the lappet-warts and in small groups subdorsally; dorsal patches of short crimson hairs in which the white subdorsal clusters arise. Thoracic feet yellow-white; outer sides of the abdominal feet also of this color.

The cocoon is white, and the short crimson hairs are thrust through it in irregular patches.

Food plaut: *Persa gratissima.*

MEGALOPYGIDÆ.

Megalopyge albicollis superba Hy. Edwards.

Larva.—Head rounded, retracted in joint 2, which in turn is within joint 3, except for its hairy front margin. Body elliptical, somewhat flattened on the ventral part; of a dull reddish color, entirely covered by the long dense hairs; hairs foxy red, curving smoothly backward, a little keeled on the dorsal line; no special tufts or curls. Feet normal, the thoracic feet small; an extra pair of poorly developed feet on joints 6 and 11.

Before the last stage, the larva has fine white hair, higher and crested on joints 4-5 and projecting backward in a loose tuft behind; some feathered curling black hairs in little tufts subdorsally, embellishing the bases of the anterior and posterior tufts.

Actual date of issue, March 13, 1912.

# PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON.

VOL. XVI APRIL - JUNE, 1912. No. 2

MEETING OF JANUARY 4, 1912.

The 255th regular meeting of the Society was entertained by Mr. Crawford at the Saengerbund Hall, 314 C Street, NW. on the evening of January 4, 1912, and there were present: Messrs. Babcock, Baker, Busck, Caudell, Crawford, Cushman, Dyar, Ely, Gahan, Hall, Heidemann, Howard, Hunter, Hyslop, Jennings, Johnson, Knab, McAtee, Morgan, Meyers, Pierce, Popenoe, Quaintance, Rohwer, Runner, Russell, Sasscer, Schwarz, Scott, Vickery, Viereck, Walton, and Webb, members, and Messrs. E. B. Blakesley, Frets, Johannsen, E. H. Siegler, F. L. Simaton, and W. B. Woods, visitors. President Quaintance occupied the chair.

The minutes of the preceding meeting were read and approved.

A letter was read from Mr. Gilbert, expressing the thanks of Mrs. Gilbert, mother of the late F. C. Pratt, for the action of the Society in calling a special meeting on June 3, 1911, for the purpose of drawing up resolutions in recognition of the entomological work of her son.

Mr. Vickery proposed the name of Mr. M. M. High, and Professor Quaintance the name of Mr. E. H. Siegler, both of the Bureau of Entomology, U. S. Department of Agriculture, for active membership. Under suspension of the rules both were elected.

Mr. Schwarz, chairman of the committee of one appointed by the Executive Committee to arrange for the smoker given

in honor of the visiting Entomologists, attending the meetings of the American Association for the Advancement of Science, Friday night, December 29, 1911, reported that $61 had been collected and that the total expenses amounted to $60.10, leaving a balance of 90 cents. Mr. Schwarz moved that the excess be turned over to the Treasurer of the Society. Carried.

Dr. Howard moved that the committee be discharged with thanks. Carried.

The Recording Secretary reported that there were one hundred and four present at the smoker. Dr. Howard moved that a list of those in attendance be included in the Proceedings. Carried.

The first paper of the evening, "Some Notes on Insects Abundant in Texas in 1911" was read by Mr. Hunter.

The second paper, "On the Ants of Victoria County, Texas," by W. Dwight Pierce and J. D. Mitchell, was read by Mr. Pierce.

The third paper, "Classification of Aleyrodidæ," by A. L. Quaintance and A. S. Baker, was read by Professor Quaintance.

The fourth paper of the evening, "Some Notes upon *Ornithodores talaje*," was read by Mr. Jennings.

List of Persons Present at the Smoker December 29, 1911.

MEMBERS.

Banks, Nathan
Barber, H. S.
Burgess, A. F.
Cory, E. N.
Crawford, J. C.
Cushman, R. A.
Dyar, H. G.
Ely, Chas. R.
Foster, S. W.
Gahan, A. B.
Heidemann, Otto
Hopkins, A. D.
Howard, L. O.
Hunter, W. D.
Hyslop, J. A.
Jennings, Allan H.
Johnson, F. W.
Knab, Frederick
Marlatt, C. L.
Morgan, A. C.
Morris, E. L.
Meyers, P. R.
Nelson, Jas. A.
Phillips, E. F.
Pierce, E. D.
Popenoe, C. H.
Quaintance, A. L.
Rohwer, S. A.
Runner, G. A.
Sanders, J. G.
Sanford, H. L.
Sasscer, E. R.
Schwarz, E. A.
Snyder, Thos. E.
Styles, C. W.
Symons, T. B.
Vickery, R. A.
Vierick, H. L.
Walton, W. R.
Webb, J. L.
Zimmer, Jas. F.

VISITORS.

Ball, E. D.	Hertzog, P. H.	Plunckett, C. R..
Bartlett, O. C.	Houser, J. S.	Price, W. J.
Berger, E. W.	Hunter, S. J.	Ransom, B. H.
Blakeslee, E. B.	Illingworth, J. F.	Regan, W. S.
Bradley, J. C.	Johnson, C. W.	Rumsey, W. E.
Brooks, F. E.	King, J. L.	Rutherford, Andrew
Calvert, Philip P.	King, W. V.	Sanderson, E. D.
Conradi, A. F.	Leonard, M. D.	Sherman, Franklin, Jr.
Cooler, R.	Lewis, A. S.	Spooner, C. H.
Craighead, F. C.	McConnell, W. R.	Stedman, J. M.
Crosby, C. R.	McGregor, E. A.	Strickland, E. H.
Demuth, Geo.	McLaine, L. S.	Swenk, Myron H.
Elrod, M. J.	Mann, B. P.	Tson, Y. H. Suwen
Emerton, J. H.	Mason, Elmer B.	Walcott, Geo. N.
Felt, E. P.	Mendenhall, E. W.	Washburn, F. W.
Fisher, A. K.	Metcalf, J. P.	Woglum, R. S.
Fulton, B. T.	Milliken, F. B.	Wood, H. P.
Goodwin, W. H.	Morse, A. P.	Wood, W. B.
Grosvenor, G. H.	Newell, Wilmon	Worsham, E. Lee
Headlee, T. J.	O'Kane, W. C.	Yothers, W. W.
Hebard, Morgan	Peairs, L. M.	

NOTE ON DEVA ORNATA OTTOLENGUI.

(Lepidoptera; Noctuidæ.)

BY HARRISON G. DYAR.

In volume IX of the Cat. Lep. Phal. (p. 532, 1910), Sir G. F. Hampson includes this species in his list of "species omitted" with the note "? *Chalcopasta*, sect. with long upturned palpi." The type is before me, and I am of the opinion that the above brief remark aptly describes the relationship of the species. However, the effect of the presence of long palpi covering the front has been to entirely obliterate the frontal tubercular structure, the front being gently bulging, perfectly smooth, without any trace of the usual tubercle. This prevents the inclusion of the species in *Chalcopasta*, in spite of the conformable facies and thoracic tufting, so that a new generic term must be employed. I propose RODRIGUESIA, for Dr. R. Ottolengui, who originally indicated that the genus was new, but did not name it. The front legs are missing in the type, but presuming that a claw is present, the genus falls in the table on page 3 of vol. IX above mentioned, where it will form a new section between *Xanthiria* and *Pseudoligia*, "Frons with rounded prominence without corneous plate below it."

SOME NOTES ON INSECT ABUNDANCE IN TEXAS IN 1911.

By W. D. Hunter,
Bureau of Entomology, U. S. Dept. of Agriculture.

These notes are not presented with the idea that they are of any special importance, but it is believed that when similar notes are placed on record from different seasons that some light may possibly be thrown upon the laws which govern the sudden increase of species. In the case of injurious forms this may be of economic importance.

Fluctuations in numbers of insects from season to season are apparently brought about primarily by enemies and by climatic conditions. The conditions in Texas in 1911 were very peculiar. The most striking feature was a marked deficiency in precipitation. Early in the spring the departure from the normal began and continued until about the first of August. So great was the effect of the drought that all vegetation in the State was affected. The corn crop was practically ruined and a similar disaster would have overtaken the cotton crop if it had not been for rains which came just before they would have been too late. Drought prevailed also during the season of 1910 and again in 1909. In fact, 1911 was the culmination of three years which were marked by extreme conditions of dryness. At the same time temperatures had occurred which theoretically would seem to be decidedly adverse to insects. One of the most remarkable occurrences of this kind was the killing frost of October 29, 1910, which took place considerably in advance of the normal date. All these circumstances combined to cause a set of conditions which would have been supposed to have contributed to the scarcity of insects rather than to their abundance. On this account the notes to be presented may be of some special interest. It may be stated parenthetically that the cotton boll weevil was the only important species which seems to have behaved as would have been expected. It was properly subjugated by the drought.

The most conspicuous example of insect abundance in 1911 in Texas was that of *Alabama argillacea* Hbn. This matter has been discussed elsewhere recently and will be passed over in this connection, more especially since it concerns a species which became abundant by an invasion of the country and not by sudden increase from a local source.

Two enemies of the cotton worm assumed very large numbers. One of these was *Calosoma lugubre* Say. This is not an uncommon insect in Texas and is found at the electric lights in some abundance during practically every season.

The normal swarms at the lights, however, were exceedingly insignificant compared to the enormous numbers to be found in the fall of 1911. The abundance became most marked about October 8, but continued until the last days of that month. The maximum flight occurred on October 11. At that time, in places where strong arc lights were to be found, it would have been possible to have collected several barrels of the insects in a very short time. No other species of *Calosoma* were observed. Special observations were made to determine whether *scrutator*, *willcoxi*, or *calidum* or other more or less common species were to be found, but without result. Undoubtedly the invasion of *Calosoma* was due to the great numbers of the cotton worms to be found in the fields at that time. The flight was general, as was shown by notes made at Victoria, Texas, by Mr. J. D. Mitchell and accounts which appeared in the newspapers. By the end of October the beetles had practically disappeared.

The other enemy of the cotton worm which appeared in great numbers was *Chalcis ovata*. At the laboratory in Dallas during October and November a dozen specimens were sometimes found upon a single window at one time. This is undoubtedly another example of a rapid adjustment to an abundant host supply furnished by the increase in the numbers of the cotton worm.

Termes flavipes K. is not uncommon in Texas, where swarms occur ordinarily during the early part of the season. In 1911, however, the insect did not come into notice until about the middle of October. At that time much more than usual numbers were to be seen throughout the State.

Gryllus pennsylvanicus.—This species occurs in great numbers almost every season in Texas. The origin of the swarms is not known. In October, 1911, a very unusual flight began and the number of the insects present about the electric lights far surpassed the numbers seen at any time during the writer's more than ten years' experience in the State.

Sphenophorus parvulus is a rather uncommon species which feeds upon the roots of Bermuda grass. Mr. W. D. Pierce made notes on the abundance of this species. During the early part of November, in a walk of four or five blocks from the laboratory at Dallas, he would frequently see from 50 to 100 adults. Only isolated specimens had ever been observed on previous occasions. This species was not attracted to lights.

Athysanus exitiosus Ball.—This species was undoubtedly the most conspicuous during the season on account of its swarms about electric lights. The occurrence of this insect

in large numbers is not uncommon, but during 1911 the numbers were far in excess of those usually seen. In Dallas, Texas, the swarms were so dense that some of the arc lights were extinguished and great inconvenience was caused in shops and homes on account of the ingress of the insects. Its small size allowed it to pass through the meshes of such screens as are used to keep out mosquitoes and house flies. To say that it was found in millions upon millions around lights both within and without buildings gives but an inadequate idea of the incalculable numbers that were present. The invasion resulted in the closing of many shops as soon as darkness began. This began on September 18 and continued until the 25th. After the latter date the numbers dropped off very rapidly.

This species occurred in great numbers in many places outside of Texas. Prof. F. M. Webster informs the writer that swarms similar to those which occurred at Dallas were observed at Wellington, Kansas. At that place they appeared first on September 20.

Along with the specimens of *Athysanus exitiosus* were numerous other Hemiptera which Mr. O. Heidemann has determined as indicated below. It will be noted that a considerable number of predatory forms occurred.

Dræcucephala reticulata Ball.
Xerophlea viridis Ball.
Pamera bilobata Say.
Julisus multispinosus Ashm.
Harmostes reflexulus Stal.
Mecidea longula Stal.
Reuteroscopus ornatus Reut.
Lygus approximatus Reut.
Pœciloscytus basalis Reut.

This swarming attracted all the more attention by reason of the fact that it was simultaneous with the swarming of *Calosoma lugubre* and *Alabama argillacea*. In fact, there was such a conglomeration of species in such unsurpassed numbers of individuals that the incident will long be considered historic by the residents of Texas.

Records of the observation of enormous numbers of May flies are not uncommon in the literature. The only special interest of the present note is on account of the southern locality. Apparently the great flights which have been observed have taken place in much more northern localities, as along the St. Lawrence River and the Great Lakes. In May Mr. J. D. Mitchell observed remarkable multitudes of *Hexagenia bilineata* Say on the Guadalupe River below Victoria. This locality is at least a hundred miles south of the latitude of New Orleans. The occurrence is well described in Mr. Mitchell's notes, which read as follows:

We ran into a swarm of May flies about ten miles above the junction of the Guadalupe and San Antonio rivers at about 3 p. m. They were clinging to the overhanging trees and as the boat would brush against the trees, distrubing the flies, clouds of them would flutter in the air. Great patches of them would fall into the river and thousands would light on the boat. This condition continued until we reached Tivoli, on the west bank of the river, in Refugio County, where we tied up for the night. We sailed 11 or 12 miles by the river through the flies. The deck in places was slippery from stepping on their bodies and the sides and parts of the boat not swept by passing tree tops were covered with them, in places so close together as to obscure the color of the wood.

Next morning, May 25, I arose at daylight and there appeared to be a heavy fog over the river. As daylight increased I observed that the fog was May flies. The wind was very light and they were all flying upstream. The swarm filled the river space from timber to timber and from water surface to about 8 feet high. The current threw the dead ones to the center of the river, where they formed a broad gray streak of drift. By 7:30 a. m. the bulk of the swarm had lit on the overhanging trees, until they bent the limbs and obliterated the natural color of the tree trunks.

These fragmentary notes are presented merely because they may be of use when taken in connection with others that may be presented. No adequate explanation of the great abundance that has been noted occurs to the writer. All that can be said is that they show a very remarkable ability on the part of insects to survive very adverse climatic vicissitudes.

Mr. Knab stated that on a visit to South Carolina, in early August, he had observed a most remarkable abundance of the larvæ of a buprestid leaf-miner, undoubtedly *Brachys*. It was at Swansea, 20 miles south of Columbia, in the sand region of the central part of the State. The predominating trees in that region are the oaks and these all showed an abundance of the brown blotch-mines on the leaves. So abundant were they that the aspect of the landscape was transformed, many of the trees appearing as if dying. On some trees every leaf was infested, and frequently there were two or three larvæ in one leaf. He had sent a quantity of leaves containing larvæ to the Bureau of Entomology, but they were not reared.

Dr. Howard said that while the problem of the increase of the species mentioned after such remarkably dry seasons is a complicated one, it is obvious that such conditions of

drought would favor the increase of such insects as are customarily greatly reduced in numbers by fungus diseases. He mentioned a rapid assembling of *Calosoma willcoxi* at Huntsville, Alabama, in 1881, during an outbreak of the army worm, as resembling the instance mentioned by Mr. Hunter. He also said that *Chalcis ovata* is a general parasite of lepidopterous pupæ and that its appearance in Texas last summer was simply another assembling of individuals and concentration of the whole in the cotton fields so abundantly stocked with those insects.

NOTE ON A STERICTA FROM TROPICAL AMERICA.

(Lepidoptera; Pyralidæ.)

BY HARRISON G. DYAR.

Stericta albifasciata Druce.

Cecidiptera albifasciata Druce, Ann. Mag. N. H., (7) IX, 325, 1902.

Male.—Process of antenna reaching back to middle of thorax; palpi upturned, much exceeding the vertex. Thorax dark gray, intermixed with olivaceous and purplish; abdomen pale ocherous. Fore wing purplish, intermixed with olivaceous, clouded with blackish in the end of the cell and along inner margin to base; a large round pure white patch across the center of the cell to submedian; inner line beyond the white patch, geminate, dark outer line rather near the margin, crenulate, followed by a light shade like the pale filling of the inner line, gently curved, bent in a little on submedian; a row of terminal black dashes. Hind wing whitish, the apex and fringe shaded with purplish, in which traces of a pale submarginal line are visible. Expanse, 25 mm.

Female.—Similar to the male, but without the white patch. Basal space darkly shaded to the inner (mesial) line, with a black streak along submedian fold and one in cell; no dark shade beyond the inner line at end of cell, but instead a small dark discal dot, followed by a median blackish line, which is angled in the center and lost below. Hind wings more yellowish and sordid than in the male, the marginal dark shading more extensive. Expanse, 30 mm.

One male, St. Jean, Maroni River, French Guiana, July, 1904 (W. Schaus); one male, one female, St. Joseph, Trinidad, December and January, 1910, larvæ in nests on avocado (F. W. Urich).

The species extends throughout tropical America, having been originally described by Druce from Ecuador and Peru. It has been taken in Costa Rica by Schaus and in Mexico (Misantla, May, August, November, 1910, June, 1911) by Müller. The identification has been made by Mr. Schaus, who compared specimens in London.

THE ANTS OF VICTORIA COUNTY, TEXAS.

By J. D. Mitchell and W. Dwight Pierce,
Bureau of Entomology, U. S. Dept. of Agriculture.

The present paper is presented in pursuance of a plan to list the insects of Victoria County, which presents so many types of fauna and flora. The first paper of the series, entitled "The Weevils of Victoria County, Texas," published in volume XIII, pages 45 to 62, of these Proceedings, gives a discussion of the peculiarities of the county, and it is therefore unnecessary to mention them again. The ants listed and discussed below have almost entirely been determined by Dr. W. M. Wheeler, to whom we express our appreciation for his many kindnesses. Forty-six forms of ants are herewith listed, which gives the county one-third of the entire number of forms (140) listed for Texas by Dr. Wheeler in his recent volume on "Ants; Their Structure, Development, and Behavior." We would call especial attention to the notes on the dispersion of several species by floods.

PONERIDÆ.

Pachycondyla harpax Fabricius.

This large black species nests on the ground under logs, between the bark and log, or in badly decayed logs. It has been found in this county only in the moist sections, such as river bottoms and near the margin of lakes. The colonies are comparatively small, none having been found with more than 150 adults. A colony consisting of only 1 queen, 3 males, and 16 workers was found. Colonies found in February are generally hibernating, all of the ants being closely huddled and quiet. Winged ants have been found February 2, but the first immature stages were found early in March. The pupæ are protected by a cocoon. Workers have been taken foraging under cow chips (Mitchell).

Ponera trigona (Mayr) **opacior** Forel.

Several workers were found in the roots of *Chenopodium* on March 29, 1909 (Mitchell). Two colonies have been taken in February on Garcitas Creek in cavities in the ground under sticks. One colony consisted of 13 workers and the other of 20 workers.

Leptogenys (Lobopelta) elongata Buckley.

This elongate brown species has been frequently taken in this county between February 3 and March 16, and invari-

ably under logs in the river bottoms. On February 26 ten ants were found in a bunch with a single pupa (Mitchell). Specimens have also been taken November 19 (F. C. Pratt).

Odontomachus clarus Roger.

This species was taken in an adjoining county on June 19, 1907, on *Anthemis arvensis* (Mitchell). The species has been found resting in the ground.

Ectatomma tuberculatum Olivier.

This ant was colonized in Victoria County from Guatemala in the years 1904, 1905, 1906. The colonies were of rather small size. Their foraging habits were very closely watched. They are very fond of honeydew and nectar, but also require insect food. The short-sightedness and feeble sensory powers render an abundance of insect food necessary to furnish the wants of the colony for solid food. At Victoria in July they were most active about 8 o'clock in the morning and from 3 to 7 in the afternoon. It was noticed that while considerable food was stored in food chambers, the small native ants generally made away with most of it. The distance foraged was seldom over 10 feet. The ants were observed to kill boll weevils (*Anthonomus grandis*), caterpillars, and other ants. Whenever individuals of *Pogonomyrmex barbatus* encountered one of the strangers there was a struggle and the native ant lay dead, but in the end the cooperation of *Pogonomyrmex* prevailed over the individual prowess of *Ectatomma*, which seems to have no instinct prompting mutual help. All attempts to establish this species firmly appear to have ended disastrously (Pierce).

DORYLIDÆ.

Eciton cœcum Latreille.

This species was found nesting March 4, 1910, in alluvial soil. The workers were of three sizes. Males have been taken many times at lights of houses and camp fires in this and surrounding counties (Mitchell).

Eciton (Acamatus) opacithorax Emery.

A large aggressive colony was taken under a dead log, April 14, 1909 (Mitchell).

Eciton (Acamatus) harrisi Haldeman.

This species was collected at Victoria, Texas, September 18, 1904.

Eciton (Acamatus) mexicanus F. Smith.

This species was collected July 6, 1905, by A. McLachlan.

MYRMICIDÆ.

Pseudomyrma gracilis (Emery) mexicana Roger.

These peculiar looking ants are always found near water courses and lakes. The colonies are usually small. They have never been seen with more than 30 in a colony. On May 25, 1909, a colony consisting of queens, males, workers, pupæ, and larvæ was found in a dead limb of a live-oak tree. On May 17, 1909, a similar colony was found with winged queen and male, workers, and male and female pupæ. On October 25, 1909, a colony consisting of only 3 workers, 4 larvæ, and 2 pupæ was found in a dead live-oak twig. On March 4, 1910, a single ant was taken on a willow tree. March 3, 1911, two colonies were found in abandoned live-oak twig galls of *Amphibolips*. Workers have been taken on grapevine December 19, 1910, and on mistletoe January 16, 1911. A colony consisting of queen, 3 pupæ, and 3 larvæ of different sizes was found in an empty blackjack acorn on the ground October 25, 1911 (Mitchell).

Pseudomyrma pallida F. Smith.

A colony of this yellow ant was found in a stem of *Iva ciliata* January 17, 1910 (Mitchell).

Pseudomyrma flavidula F. Smith.

This species is usually found in the neighborhood of water courses and lakes. The colonies are sometimes large. On December 15, 1908, a colony consisting of winged forms, workers, and larvæ was found in a stem of *Solidago*. A nest was found in the stem of a dead *Xanthium* January 16, 1909. On March 19, 1909, a colony of females, workers, larvæ, and eggs was found in a stem of *Iva ciliata*. On January 28, 1910, a colony was taken in the stem of *Ambrosia trifida*, and in another large stem of the same species several connected colonies were found—there were 3 or 4 queens. A colony was found in a stem of *Iva ciliata* February 12, 1910, and on February 19 one was found in *Ambrosia*. March 16, 1911, in a stem of *Iva ciliata*, a queen, 30 workers, and 61 immature stages were found (Mitchell).

Psudomyrma brunnea F. Smith.

A small colony of workers and larvæ was found in a dead twig March 6, 1909. A worker was taken on mistletoe January 16, 1911 (Mitchell).

Monomorium pharaonis Linnæus.

This introduced ant has not only been a bad pest in the house, but has also been found nesting in the woods under bark of pecan and elm logs and also under the bark of a live pecan tree (Mitchell). This species has been taken attacking the immature stages of the boll weevil (W. W. Yothers).

Monomorium carbonarium F. Smith.

Workers of this species were three times found in buds of *Callirrhoë involucrata* devouring larvæ of *Anthonomus fulvus*, May 24, 1907. They were also found in the blooms at pollen. On February 24, 1909, a colony including queens, workers, and larvæ was found under bark of a dead elm log. A small lot of ants was taken March 6, 1909, from cells of *Aræcerus fasciculatus* in dried cornstalks. A nest with a few immature stages was located in a decaying ash stump, March 27, 1909 (Mitchell).

Monomorium minimum Buckley.

Under the bark of a willow log on March 12, 1911, an enormous colony was uncovered. This embraced practically the entire upper surface of the log for a distance of 33 feet. The entire space was connected by many galleries and every 3 to 6 inches was a queen with young. Four queens were observed in one batch of immature stages. On May 22, 1909, a colony with 7 queens was found under the bark of a dead sycamore (Mitchell).

Solenopsis geminata Fabricius.

The fire ant is very common in Victoria County. It nests in logs, stumps, and in the open ground and frequently invades dwellings. It has been taken as an enemy of the boll weevil by W. E. Hinds, July 22, 1907. It was taken in abundance on mistletoe (*Phoradendron flavescens*) January 16,1911 (Mitchell).

Solenopsis geminata (Fabricius) **diabola** Wheeler.

This is the commonest variety of this ant at Victoria.

Solenopsis texana Emery.

This tiny species is usually found in the wooded country, as the following records show. On February 24, 1909, a colony was found under bark of a dead elm log. It contained 2 queens, many workers, pupæ, and larvæ. On April 19 colonies were found in a rotting pecan log and in tree fungus; on April 26 in elm stumps; on May 20 and 22 under bark of pecan trees, each colony with one or more queens (Mitchell).

Solenopsis sp.

A very tiny species of ant has been taken quite frequently nesting in dead pecan twigs and under bark.

Pheidole dentata Mayr.

Colonies of this ant are very large and when disturbed they swarm out in large numbers, seeking the intruder and making it interesting for anyone desiring to make close observations. In defending their nests they are only surpassed by the giants *Neoponera villosa*. They build in dead wood, in the ground under logs, chunks, and stones, and occasionally among the roots of vegetation. In April, 1897, the senior writer observed a colony in high water floating down the Guadelupe River. They were on a chunk of dead wood, which was almost submerged. The ants were collected on the upper part in two clusters, with a string of workers connecting them. One bunch protected the queen, the other the immature stages. They fought savagely to protect both queen and young. On February 16, 1909, a colony was taken from a rotting log in the river bottoms. Other colonies were found in similar places March 20 and April 14. On May 22, 1909, a large colony was found in a pecan log. Many pupæ were in the act of molting to adults. When the nest was disturbed the workers and soldiers did not show their usual aggressiveness, but gave their attention to the unfortunate immature adults, caring for them as they would for larvæ or pupæ (Mitchell).

Pheidole spp.

Other species of *Pheidole* occur in the county, but have not been determined.

Cremastogaster lineolata Say.

A worker was collected in the cell of a beetle larva in a root of *Chenopodium*, February 20, 1909. A colony was collected in a live-oak twig gall of *Amphibolips* May 18, 1909. Workers were collected on mistletoe January 16, 1911 (Mitchell).

Cremastogaster lineolata (Say) **læviuscula** (Mayr) **clara** Mayr.

On March 4 and 7, 1910, colonies of this form were found nesting under bark of live and dead willow trees (Mitchell).

Cremastogaster ashmeadi Mayr.

Specimens were collected April 8, 1907 (Mitchell).

Aphænogaster fulva (Roger) **aquia** (Buckley) **texana** Emery.

A large colony of this species was found in a decaying log. They were very fierce (Mitchell).

Pogonomyrmex barbatus (F. Smith) **molefaciens** Buckley.

This common hillock ant occurs all over Victoria County. The majority of the colonies clear a space aroung the hole from 3 to 6 feet in diameter. Their runways are also bare of vegetation and may extend 50 feet or more; one pathway was an inch wide and extended 125 feet. The ants cut off the plants in their way and remove the débris to the side. On sunny days one can always see a steady stream of foragers on these paths, those going homeward carrying either seed or insects. Numerous large caterpillars and a cricket were seen carried into the nests. Near the hole there is usually a pile of seed hulls, which are brought out of the nest about as fast as seed are taken in. As rainy weather approaches the foragers all hurry home and no others go out. Several times remains of this ant were found in the excrement of the horned toad (*Phrynosoma cornuta*), and one colony was absolutely exterminated before the enemy left it (Pierce). The males and females swarm out of the nests in May and June, usually just after a rain, covering the ground for many feet around the nest. Here the mating takes place, after which the females fly. When they alight, they cast their wings and begin digging a cell for a new colony. The males are driven away by the workers or killed if they persist in returning. The swarming is a harvest for the birds. A colony of nesting jackdaws was observed to clean up an entire swarm in a short time. Woodpeckers destroy a great many. Doves have been credited with feeding on this ant, since they have been often seen picking on the ant hillocks. The senior writer has killed several doves on the hillocks but has found no ants in their crops. The doves were probably collecting the fine gravel brought up by the ants. The workers are fierce in defending their home, never running from an enemy. Their sting is very painful, but not dangerous.

During heavy rains or floods the ants collect on top of the hillock and await the falling of the water. They have been observed several times floating in a mass on the water anchored to weed stems, the most important observations of this kind having been made during the great storm of September 15 to 17, 1875, which drowned thousands of quail, grouse, rabbits, and skunks.

Leptothorax sp.

On April 17, 1908, a complete colony was found in the hollowed interior of a green fruit of *Opuntia*. Workers were found March 19, 1909, in a dead twig of *Xanthoxylum clava-herculis* (Mitchell).

Macromischa subditiva Wheeler.

On January 7 a colony, composed of queen, workers and eggs, was found under bark of willow (Mitchell).

Cryptocerus angustus Mayr.

A colony was found in an oak twig gall, January 5, 1907. On March 19, 1909, a colony, composed of 3 queens, soldiers, workers, larvæ, and eggs, was found in a dead twig of *Xanthoxylum clavaherculis*. On April 6 another colony with larvæ was found in a dead pecan twig on the tree, and on May 18 a colony with larvæ and pupæ was taken in a dead twig on a live oak tree. On October 25 a colony in live-oak twig was found with adults and pupæ only. March 16, 1911, two colonies were taken from live oak twig galls of *Amphibolips* (Mitchell).

Strumigenys louisianæ Roger.

On March 6, 1909, a populous colony with larvæ was found in a lepidopterous burrow in mitsletoe (*Phoradendron flavescens*). On March 19 workers were found in the roots of *Chenopodium* (Mitchell).

Atta texana Buckley.

On July 23, 1904, a colony of this leaf-cutter ant was visited, which was doing considerable damage to beans. They were not injuring the leaves, but were cutting portions of the bean-pod hulls. A very large caste were guarding the entrance to the holes, a slightly smaller caste were doing the cutting, the next caste were picking up the cut bits and carrying them in, and two smaller castes were carrying out dirt (Pierce). In May, 1892, a large number of winged forms passed from north to south on Main street, Victoria. The swarm was about 30 feet long and over 8 feet wide. They traveled south in a zigzag path for two blocks and then began flying away singly. On one occasion a large mass of these ants was observed floating in the Guadelupe River. The mass was about 2 feet across, and the ants were clinging to each other. They had drifted into quiet water and were held by débris (Mitchell).

DOLICHODERIDÆ.

Dorymyrmex pyramicus Roger.

This species nests in hard ground on the prairie. The workers are very quick and secretive in their actions.

Dorymyrmex pyramicus (Roger) **flavus** Pergande.

This form also nests in the ground on the prairie. Workers have been taken on plants. On February 20, 1909, a worker was taken from the cell of a beetle larva in a root of *Chenopodium*. It has been taken on *Helenium*, October 28,1907, and on *Croton*, September 19 (Mitchell).

Iridomyrmex analis Ern. André.

Taken on *Acacia*, July 8, 1907 (Mitchell). The species nests in the ground.

Forelius maccooki Forel.

Winged forms were taken at lights, July 13, 1910. Workers were collected on *Helianthus* September 8, 1907 (Mitchell). This species nests in hard ground.

CAMPONOTIDÆ.

Prenolepis (**Nylanderia**) **longicornis** Latreille.

Specimens were found in huisache (*Vachellia farnesiana*) pods, September 21, 1908 (Mitchell).

Prenolepis (**Nylanderia**) **vividula** Nylander.

A colony of seven queens, workers, and larvæ was found under bark of a pecan tree, one foot from the ground, January 22, 1910 (Mitchell).

Prenolepis (**Nylanderia**) **vividula** (Nylander) **melanderi** Wheeler.

Large numbers of winged forms were collected, flying, running, and mating, March 2, 1909. A winged male was taken on mistletoe January 16, 1911 (Mitchell). The species has been found nesting under logs.

Formica pallidefulva (Latreille) **schaufussi** (Mayr) **meridionalis** Wheeler.

Collected at Victoria, August, 1904 (C. M. Walker), and at Edna, May 7, 1907 (Mitchell).

Camponotus herculeanus (Linnæus) **pennsylvanicus** DeGeer.

This large black ant occurs in the wooded regions. On May 7, 1908, a nest was found in a post-oak tree, 8 feet from the ground. The ants on the ground were in combat with *Pogonomyrmex barbatus molefaciens*, and seemed to get the worst of the fray. On March 24, 1909, a terrific wind storm broke off the top of a cottonwood tree. A colony of this species was located in the decayed section, which had been fully 40 feet from the ground before the accident. After

sawing out the section containing the nest it was split open with an ax. There were many hundreds of ants, and from the first blow to the last they were busy, each class to its own work. The large, heavy-jawed individuals, comprising about two-thirds of the colony, came out to fight. They were active and aggressive, spreading out 3 feet from the log in every direction, seeking their enemy. In defense they were far inferior to *Neoponera villosa*. The larvæ were very few and were cared for by small, slender workers. February 15, 1910, a colony was found in the center of a decayed willow tree, clustered in several small connected cells, being packed closely for hibernation. The colony consisted of four winged forms, 45 nurses, 61 medium-sized workers, and 74 large foragers. This colony was shipped to Dallas for observation (Mitchell). The winged forms all died en route. The remainder were placed in a breeding-cage. On May 2 a cluster of eggs was noticed surrounded by workers. The eggs hatched in due time, but the larvæ developed very slowly. They were separated into groups June 3. July 9 a cocoon was observed inclosing one of the largest larvæ. July 15 two more cocoons were formed. July 29 a winged male hatched out (H. Pinkus). September 28, 1911, a colony of approximately 1,000 adults was located in a decayed willow log. The soft parts of the wood had been removed from the inside of the log, making irregular cells. The colony consisted of winged males and females, one wingless female, soldiers, workers, nurses, and pupæ. The winged forms were more numerous than the wingless. The nurses were very faithful to their charges. On February 14, 1911, a colony was found in a fallen cottonwood with 300 or 400 winged ants.

Camponotus planatus Roger.

A few workers were found on low ground May 8, 1909. They were shy and hid quickly.

Camponotus fallax (Nylander) **rasilis** Wheeler.

This species was taken November 6, 1902, on cotton, and also September 18, 1904 (W. E. Hinds).

Camponotus fallax (Nylander) **discolor** Buckley.

A colony of this ant was found in a stem of *Xanthium*, December 29, 1908, consisting only of queens, males, and workers. On January 16, 1909, a similar colony was found in the same species of plant. On May 18, 1909, a colony was taken from an old live-oak twig gall of *Amphibolips*. On February 25, 1910, a large colony of winged males, females, and workers was found under the bark of a dead willow tree

(Mitchell). A colony with all forms was found in a lepidopterous cavity in mistletoe, March 8, 1909.

Camponotus (Colobopsis) abdita (Forel) **etiolata** Wheeler.

A colony with larvæ was found in a dead live-oak twig, October 25, 1909 (Mitchell).

Camponotus (Colobopsis) pylartes Wheeler.

A colony composed of queen, 6 workers, and 4 larvæ was found in a dead twig on a pecan tree, April 5, 1909 (Mitchell).

Camponotus (Colobopsis) pylartes (Wheeler) **hunteri** Wheeler.

Colonies composed of queens, workers, and larvæ were found in hollow twigs on pecan trees, April 2 and 12, 1909 (Mitchell.)

In discussing Mr. Pierce's paper, Mr. McAtee called attention to the fact that Mr. Pierce's examinations with negative results of the stomachs of mourning doves which were supposed to be eating ants confirmed previous findings regarding this bird. Mr. Schwarz had examined about 220 stomachs without finding any insects, and the Biological Survey of the United States Department of Agriculture had examined more than 250 with almost the same result. The most interesting animal remains in dove stomachs were apparently weathered segments of millipeds, which indoubtedly were parts of long-dead animals, taken perhaps in lieu of gravel. This called to mind another observation which definitely proves that dead insects are sometimes taken, and which furthermore has bearing on the habits of ants. Two specimens of *Serica* taken from the stomach of a roadrunner (*Geococcyx californianus*) collected at Seaside, California, had the weathered appearance noted above and were in fact mere empty hulks. In the abdominal cavity of one specimen were eight *Momorum muriatum* and in the other two. These little ants were in perfect condition, which proves they were in the bodies of the beetles when swallowed by the bird.

SOME NOTES ON THE TICK ORNITHODOROS TALAJE GUERIN.

BY ALLAN H. JENNINGS.

In 1910, while connected with the laboratory of Ancon Hospital at Ancon, Panama Canal Zone, I made a series of observations upon the domestic rats of Panama and their ectoparasites, these observations being continued daily for seven months.

During that time about 2,300 rats were examined. The material was received alive, chiefly from the health officer of the city of Panama, though a small number of animals was sent from Colon, together with a few from the Canal Zone. The species received were, in the order of their abundance, *Mus norvegicus* (brown rat), *Mus rattus* (black rat), *Mus alexandrinus* (roof rat), and *Mus musculus* (house mouse).

When chloroformed and examined for parasites, many rats were found to be infested by large numbers of the larval stage of an argasid tick which was subsequently identified by Mr. Nathan Banks as *Ornithodoros talaje.*

Though taken from all three of the species of rats, the brown rat was by far the most heavily infested and of the many hundreds of the ticks examined but a small percentage was taken upon the other forms, none occurring upon the house mouse. It should be noted that the nesting habits of the brown rat are different from those of the black and roof species in that the brown rat is essentially a burrowing animal, while the nests of the other species are usually above ground, in the walls of houses and even in trees.

Brown rats from Colon were also found to harbor the ticks, though the proportion of animals infested and the degree of infestation was less than among those from the city of Panama. However, the number received from the former city was not great enough to warrant the formation of definite conclusions as to their abundance. But that *Ornithodoros talaje* occurs on the Atlantic side of the Isthmus is certain.

The larvæ were attached to almost all parts of the bodies of the animals, but showed a marked preference for the posterior portion of the dorsum. A peculiarity regarding the points of attachment was that in almost all infested animals, especially in those in which the infestation was heavy, a considerable portion of the parasites could have been easily reached by the teeth of the host, yet they were not destroyed. Thus it would seem that a cetrain toleration for them has been established in the rodent. In many cases in which gross infestation of the dorsum occurred, the irritation caused by

the parasites was so great that a pronounced dermatitis had been set up. This occurred oftenest in fully adult and old individuals in which the coat was coarse and scanty.

With the exception of two nymphs taken from one *Mus norvegicus*, all of about 3000 of the ticks examined were larvæ, it being evidently the habit of the species to drop from the rodent host before molting into the nymphal stage.

A number of full-grown larvæ which survived anæsthesia were preserved alive, and though attempts to induce them to reattach to white rats failed, they molted, and as nymphs survived without food for about five months, during which period at least one molt occurred.

The feeding habits of the nymph are not known to me, but in Panama, as is known to be the case elsewhere, the adult attacks man, adopting the habits of the bedbug. Whether the rat shares with man the attentions of the adult tick I do not know, though this is indicated.

From the abundance of the larvæ upon Panama rats, the adults should be numerous in the houses of the poorer classes in that city, but efforts to secure specimens were unavailing. It is probable that the inhabitants do not distinguish accurately between the species and *Cimex lectularius*, specimens of which latter were invariably brought when "mamones," the native name for this tick, were asked for and promised by the collectors.

They occur in villages of the interior, Dr. Darling having collected them at Chorera, where the people showed evidences of their attacks. Their abundance there is probably less than in Panama if the numbers of the larvæ observed in the latter place is a sufficient indication. This may be due to the fact that *Mus rattus* is the common house rat of the country districts, while the brown rat prevails in the urban portions of the city of Panama. This hypothesis implies that the preference manifested by the tick for the brown rat is constant and not due to local conditions, further observations being necessary to establish the fact.

I believe this to be the first record of the domestic rat serving as host for the larvæ of *Ornithodoros talaje*. The double rôle as parasite of rodent and man played by this species, suggests the possibility of disease transmission from one to the other of these hosts.

THE CLASSIFICATION OF THE ALEYRODIDÆ.

Messrs. A. L. Quaintance and A. C. Baker presented a paper dealing with the principles of classification of the Aleyrodidæ which they had determined as a result of the study of the forms thus far known. A new subfamily was established and several new genera and species described. The paper treats of all known members of the family, except those belonging to *Aleyrodes*, which will be made the subject of a subsequent publication. The paper in full will be issued in the Technical Series of bulletins of the Bureau of Entomology, United States Department of Agriculture.

Under the heading "Notes and Exhibition of Specimens," Mr. Knab spoke of the dependence of disease transmission by blood-sucking insects upon habits. This seems to have been overlooked by investigators of this subject and many insects have been suspected which, from the present viewpoint, must be eliminated. In order to be a potential transmitter of human disease an insect must be closely associated with man and normally have opportunity to suck his blood repeatedly. It is not sufficient that occasional specimens bite man, as is the case with forest mosquitoes. Although a person may be bitten by a large number of such mosquitoes, the chances that any of these mosquitoes survive to develop the parasites in question, and then find opportunity to bite and infect another person, are altogether too remote. On this principle Simuliidæ and Tabanidæ, as well as the numerous sylvan mosquitoes, can be confidently eliminated. Moreover, most of these insects are active only during a limited season and consequently there is too great an interval during which no transmission could occur.

The truth is that all insects that have been found to be transmitters of disease are more or less closely associated with man and habitually suck his blood. This has long been recognized in the case of the two house-mosquitoes of the tropics, the one (*Aëdes calopus*) being the intermediary host of the yellow fever organism, the other (*Culex quinquefascia-*

tus) of those of filariasis and dengue fever. It is only through a combination of circumstances that these insects are effective transmitters. These conditions are: the association with man and a predilection for his blood, abundance, comparative longevity, and consequent repetition of blood-meals at intervals, and finally, practically continuous breeding, so that individuals are always present to act as intermediary hosts of the parasites. Thus the chain in the life-cycle of the parasite is never broken.

The relation of the different species of *Anopheles* to the transmission of malaria seems never to have been considered in this light. It was, however, brought out in an interesting manner in a paper on mosquito-control in the Panama Canal Zone, read by Mr. Jennings at the recent meeting of the Association of Economic Entomologists. Mr. Jennings pointed out that the different species of *Anopheles* of that region have widely different habits. Investigation of the rôle of these different species in the transmission of malaria, by inducing them to suck the blood of malaria-carriers, showed that the species (*Anopheles albimanus*) which throve most about settlements, and was most persistent in entering houses and obtaining blood, was the principal factor in malaria transmission, no less than 70 per cent of this species developing the parasites. Mr. Knab said that in commenting on Mr. Jennings's paper he pointed out these facts and in addition gave further evidence of the close association of *A. albimanus* with man, imparted to him by Mr. Jennings in conversation.

It appears that this species is absent from those parts of the upper Chagres River which are uninhabited and that the reason is that this mosquito not only prefers, but probably needs, human blood. Mr. Knab said that his remarks before the Economic Entomologists had been met by the assertion of Mr. Schwarz that the absence of *A. albimanus* from the upper Chagres had nothing to do with the absence of man, but was due wholly to the lack of suitable breeding-places. Mr. Knab stated that Mr. Schwarz was certainly in error and that there were plenty of suitable habitats for the larvæ of *A. albimanus*, at least in parts of the uninhabited region under consideration.

Dr. Howard called attention to the paper by Dr. Lutz of Brazil, on forest mosquitoes and forest malaria, which appeared to contradict Mr. Knab's statements.

Mr. Knab replied that he had just discussed this paper from his present viewpoint with Dr. Dyar. They had reached the conclusion that Dr. Lutz had misinterpreted the facts. Dr. Lutz's observations were made in the state of São Paulo during the construction of the railroad from the coast to the capital. The first part of the route was through the moist and heavily forested slope from the table-land to the coast, and while at work here a large part of the laborers were afflicted with malaria. Lutz searched for the transmitting *Anopheles*, but could find no breeding-places upon the steep slopes. Finally he determined that a single species of *Anopheles* (*cruzii*) was abundant in the region and that this bred in the water of epiphytic bromeliads. To this species he attributed the outbreak of malaria. It would seem now that the *Anopheles* found by Dr. Lutz probably had nothing to do with the outbreak of malaria among the construction gang. It is a well-known fact that in the tropics most persons apparently in good health have latent malaria. When such an individual comes under some physical strain, such as overexertion, fatigue, or exposure, the disease manifests itself. It therefore seems highly probable that the men observed by Lutz already harbored malaria in a latent form when they came into the region and that the exertion and exposure incident to the work caused the irruption of the disease.

Mr. Busck stated that he had investigated the mosquitoes of the upper Chagres in 1907 and could confirm Mr. Knab's statements with reference to *Anopheles albimanus*. He found that on the uninhabited parts of the Chagres *Anopheles eiseni* was the prevalent species, while *A. albimanus* was not found by him there, and this absence was not due to lack of breeding facilities. He expressed the opinion that at points still farther up on the Chagres, where there are settlements, at San Juan for example, *A. albimanus* would be found.

Meeting of February 1, 1912.

The 256th meeting of the Society was entertained by Dr. Dyar at the Studio Hall, 1219 Connecticut avenue NW., on the evening of February 1, 1912, and there were present Messrs. Babcock, Barber, Crawford, Cushman, Dyar, Ely, Hammar, Heidemann, Howard, Hyslop, Jennings, Johnson, Knab, Morgan, Pierce, Quaintance, Rohwer, Runner, Sanford, Sasscer, Schwarz, Siegler, Snyder, and Vickery, members, and Messrs. E. B. Blakesley, W. V. King, T. E. Halloway, E. A. McGregor, W. Middleton, F. L. Simaton, and R. S. Woglum, visitors. President Quaintance occupied the chair.

The minutes of the preceding meeting were read and approved.

Mr. Rohwer stated that he had recently received a communication from the Philadelphia Academy of Natural Sciences extending a very cordial invitation to the members of the Entomological Society of Washington to attend their centennial meetings March 19, 20, and 21. Mr. Schwarz moved that Mr. Viereck be elected a delegate to represent the Entomological Society of Washington at these meetings. Carried. President Quaintance suggested that a memorial in the nature of a written communication be sent to the Philadelphia Academy of Natural Sciences. Dr. Howard moved that this matter be referred to the Executive Committee with power to act. Carried.

The names of E. B. Blakesley and H. E. Smith, of the Bureau of Entomology, were proposed for active membership and in accordance with the rules were laid over until the next meeting. The name of P. H. Timberlake, Whittier, California, was proposed for corresponding membership and referred to the Executive Committee.

Dr. Howard stated that it was customary among the affiliated Societies of the Washington Academy of Sciences to nominate their presiding officer for the ensuing year to represent the organization as Vice President, and fearing that the vote of the Society had been misplaced he begged to resign and nominated President Quaintance. On a vote President Quaintance was regularly nominated to represent the

Society as a Vice President of the Washington Academy of Sciences.

The first paper of the evening, "New Microlepidoptera from Mexico," by August Busck, was read by title.

The second paper was "Observations on the Codling Moth," by A. G. Hammar.

The last paper was "An Old Question," by S. A. Rohwer.

NEW MICROLEPIDOPTERA FROM MEXICO.

By August Busck.

The following new species are part of extensive collections of Lepidoptera, received from Mr. R. Müller in Mexico City.

The species here described are not represented in the material treated in Lord Walsingham's part of the Biologia Centrali-Americana, now soon to be concluded, and are published now so as to be available for the final list of species in that paper.

Genus METOPLEURA, new (Gelechiidæ)

Type: M. potosi Busck.

Second joint of labial palpi very long, porrected, but slightly curved upward, clothed with compressed scales, which form somewhat roughened sharp anterior and posterior edges; terminal joint one-third as long as second, compressed, pointed. Maxilary palpi rudimentary. Tongue well developed, scaled, spiraled. Antennæ simple, shorter than the fore wings. Fore wings ample, elongate; costa and dorsum straight, parallel; apex produced, pointed; termen oblique, slightly sinuate below apex. 11 veins; 7 and 8 coincident, to costa; rest separate; 2 from before apical third of the cell; 3 and 4 approximate from the end of the cell; 11 from the middle of the cell; 6, 7, 8, 9, and 10 equidistant; 1 furcate at base.

Hind wings much broader that the fore wings; costa and dorsum nearly straight; apex bluntly pointed; termen evenly rounded, with a slight sinuation below apex. 8 veins; 3 and 4 closely approximate, nearly connate; 6 and 7 approximate; 5 cubital; 8 anastomosing with radius before the middle of the cell. Posterior tibiæ nearly smooth, but somewhat rough-scaled above.

Allied to and rather similar in general habitus to *Aerotypia* Walsingham, but differing in the palpi, and in having veins 7 and 8 coincident in the fore wings.

In my synoptic generic table this genus runs to *Harpagidia* Ragenot, which is unknown to me in nature, but which would seem to agree with the present genus in venation; the very different labial palpi with the short terminal joint will sufficiently differentiate the present genus.

Metopleura potosi, new species.

Labial palpi light straw-colored, speckled with fuscous. Antennæ light fuscous. Face, head, and throax light ochreous. Fore wings ochreous, longitudinally streaked along the vein, with lighter whitish ochreous. From near the base of costa runs an outwardly oblique blackish fuscous streak across half the wing and at apical fourth on the dorsal side is found a poorly defined blackish streak, parallel with termen; both of these markings are easily rubbed off and the majority of the long series before me shows only traces of them. There is a series of poorly defined dark marginal dots around apical and terminal edge. Cilia ocherous mixed with dark fuscous. Hind wings shining, dark fuscous with a light ochreous marginal line on the base of the cilia. Abdomen ochreous fuscous. Legs ochreous speckled with fuscous.

Alar expanse, 30 to 36 mm.

Habitat: Cerritos, San Luis Potosi, Mexico, August. R. Müller, collector.

Type: No. 14523, U. S. National Museum.

Cotypes in British Museum.

Ethmia proximella, new species.

Labial palpi white; second joint dusted with black exteriorly. Face and head white. Thorax white with four bluish-black dashes, two anteriorly, two posteriorly. Fore wings white with a broad black costal edging, widest on the middle of the wing; the line between this black costal part and the white dorsal part of the wing is zigzagged and irregular. On the white dorsal part of the wing are a number of round bluish-black dots, of which one is near base, one on the middle of the cell and one on the fold obliquely below; then come three dots in an oblique row, the first on the middle of dorsum, the last on the lower edge of the cell; after these there is further out another oblique row of three equidistant dots and parallel with the terminal edge is an irregular double row of less clearly defined dots. The extreme terminal edge golden yellow. Cilia white with dusky tips. Hind wings smoky white, in the male with a large yellowish costal tuft. Abdomen dark fuscous with yellow tip. Legs ochreous white; tarsi with strong black annulations.

Alar expanses, 17 to 20 mm.

Habitat: Tehuacan, Mexico. R. Müller, collector.

Type: No. 14524, U. S. National Museum.

Cotype in British Museum.

This species was sent me by Mr. Müller as *Ethmia mülleri* Busck, which it resembles in size and ornamentation; it is, however, easily distinguished by the more numerous black dots on the fore wings (in *mülleri* there are only six in three pairs), by the lack of the well-defined terminal series of black dots, and by the presence of the golden terminal line.

The species is even more similar to *E. bittenella* Busck, which is best distinguished from it by the irregularity of the form of the black dots as well as their quite different positions.

Ethmia abdominella, new species.

Labial palpi white, dusted and barred with black. Face leaden-white with a large black dot on the vertex and head. Thorax dirty leaden-white, with six black dots. Forewings with costal half dark blackish brown with scattered black longitudinal streaks and with irregular black prominences into the lighter lead-colored dorsal half, which contains three independent black spots. A series of black dots along apical and terminal margin. Cilia dirty white. Hind wings whitish, semitransparent on basal half, with smoky tip and terminal edge. Abdomen golden yellow. Legs dirty white; tarsal joints with indistinct black annulations.

Alar expanse, 30 mm.

Habitat: Tehuacan, Mexico. R. Müller, collector.

Type: No. 14525, U. S. National Museum.

Nearest to *E. arctostaphylella* Walsingham, but easily differentiated by its larger size and darker head and thorax, also by its additional black spots in the light dorsal portion of the wing.

Genus CALANTICA Zeller.

Type: albella Zeller.

This genus must, I believe, be included in the family Hemerophilidæ. The type, *Calantica albella* Zeller, has the following generic characters:

Antennæ less than the length of the fore wings, simple. Labial palpi long, thin, weak, upturned, reaching vertex; terminal joint nearly as long as second, tolerably pointed. Fore wings broad, with slightly arched costa, pointed apex, well-defined tornus, and slightly sinuate termen; 12 veins, all separate; 7 to termen; one of my slides shows veins 2 and 3 stalked; in another they are closely approximate. Hind wings are broad as the fore wings; 8 veins; 3 and 4 stalked; 6 and 7 parallel.

In this connection I would call attention to the genus *Herrickia* Staudinger, which in the European check-lists has been placed in the Hyponomeutidæ close to *Calantica* Zeller; if, however, the single specimen of the type of this genus, *excelsella* Staudinger, in the U. S. National Museum is authentic, as it presumably is, determined and labeled by O. Hoffman, this genus belongs to the Œcophoridæ and agrees well with my later genus *Fabiola* in venation and oral characters. As the general habitus is rather different, I prefer not to make *Fabiola* a synonym on the evidence of a single specimen, but the genus should be kept in mind in the future study of the family Œcophoridæ.

Calantica argentea, new species.

Labial palpi ochreous white. Face, head, and thorax silvery white. Fore wings shiny silvery white with a single short dark-brown dash on the lower corner of the cell; in some specimens with a few single scattered brown scales on the outer part of the wing. Cilia white. Hind wings silvery white with a slight smoky tinge. Abdomen white. Legs white sparsely dusted with fuscous scales and with last tarsal joint dark fuscous.

Alar expanse, 18 to 23 mm.

Habitat: Orizaba, Mexico, August, R. Müller, collector.
Type: No. 14527, U. S. National Museum.
Cotype in British Museum.

Tortrix urbana, new species.

Labial palpi reddish brown with darker tips. Face, head, and thorax reddish brown; antennæ light brown, faintly annulated with black. Fore wings light reddish brown with numerous scattered black scales tending to arrange themselves as a transverse striation. A large oblique dark-brown transverse fascia from about the middle of costa to tornus is narrowest at the costal end and gradually broadens with bulging edges towards the dorsal side. Across the tip of the wing from apical fourth of costa to the middle of termen is another dark brown fascia, which is broadest on the costal edge. Hind wings light ochreous white. Abdomen ochreous fuscous. Legs ochreous; anterior tarsi heavily annulated with black.

Alar expanse, 16 to 19 mm.

Habitat: Mexico City. R. Müller, collector.
Type: No. 14526, U. S. National Museum.
Cotype in British Museum.

A common-looking species of the *triferana* Walker group, differing from this species in the more reddish ground color and the lack of light ochreous patches.

Atteva exquisita, new species.

Labial palpi white with a bluish-black annulation at the end of second joint and with bluish-black tip of terminal joint. Antennæ black. Face white with a black transverse line. Head also white, with a black transverse line. Collar white with black anterior edge. Thorax reddish golden-yellow with white posterior tip and four black lateral dots. Fore wings with the rich reddish golden yellow ground color apparent only in the transverse fascia between the large silvery white spots, which occupy the greater part of the wing surface; extreme base of the wing red; then follows a large transverse silvery white fascia edged with dark metallic blue and with a serpentine metallic blue transverse line through the middle; next comes a reddish-yellow fascia at basal third, which is followed by another large silvery white transverse fascia, like the foregoing, edged with metallic blue and with a blue central line; following this is again a reddish-golden fascia, somewhat bent in the middle, and this is followed by a large dorsal silvery-white spot and by an adjoining small costal

white spot, both with a crooked blue line in the center and both edged with dark metallic blue. On the apical part of the wing are two costal white spots and one white fascia, separated and surrounded by metallic blue lines. Extreme apical tip golden yellow. Hind wings semitransparent, light fuscous with dark veins. Abdomen black with a conspicuous yellowish-white spot on the underside of each segment. Legs black, with narrow yellowish-white annulation at the joints.

Alar expanse, 21 mm.

Habitat: Mobano, Coahuila, Mexico, August. R. Müller, collector.

Type: No. 14528, U. S. National Museum.

This species belongs to the *aurea* group, but differs considerably from any described species in the pattern of the fore wing as well as in the white color of the spots. One of the specimens, it should however be noted, has a straw-yellow tint over the outer white spots.

—Mr. A. G. Hammar presented a paper on certain habits of the codling moth larva, relating to the reconstruction of the winter cocoon in the spring, the number of molts of the larvæ, cannibalism among larvæ, temperature control, an unusual occurrence of two larvæ passing the second winter in hibernation, and the ability of some larvæ to subsist upon foliage. A brief account was also given on some of the main results of the codling moth investigation in Michigan, and the practical application of these findings. The full account of this investigation will be published as Bulletin 115 of the Bureau of Entomology, U. S. Department of Agriculture.

At the conclusion of Mr. Hammar's paper Mr. Rohwer asked if, in breeding the moths, the larvæ of the sawfly which lives in apple had been noticed. Mr. Hammar stated that he had not observed them. Mr. Rohwer said that larvæ are rather common in Europe and larvæ with similar habits have been found in Washington State. In the same genus there are also larvæ which live in plums and cherries.

In Mr. Hammar's paper were several allusions to temperature control on the codling moth. These allusions led Mr. Pierce to remark on the fact that although temperature has a definite effect upon development, it will be found that for any degree of temperature the development will vary with the humidity, this variation sometimes being of considerable degree.

Commenting on the effect of humidity on the emergence from the soil of adults of grape root-worm and plum curculio Mr. Johnson stated that his observations in rearing plum curculio in 1906 showed that emergence of beetles was retarded and in some cases prevented by withholding moisture, whereas in adjacent cages where moisture was supplied a maximum number of beetles emerged several days earlier. In the case of the emergence of adults of the grape root-worm it was observed in 1907 that a period of dry weather occurred during the first two weeks in July, which is about the normal time of the emergence in maximum numbers of the beetles in vineyards. Up to July 14 but very few beetles emerged, though in digging they could be found in their cells in the dry soil. Heavy rains fell on the 14th and during the following two or three days the adults emerged in large numbers. This emergence in the field corresponds with the cage experiments in which moisture was applied and withheld.

Mr. Woglum mentioned the effect of hot dry weather on retardation in the emergence of adults of *Aleyrodes citri* in India. Practically matured pupæ remained dormant during a continued hot dry period of ten weeks (July–August, 1911, temperature 85° to 120° F.) but emerged within a week following first rain.

—Under the title "An Old Question," Mr. Rohwer discussed briefly, the matter of local lists. The following is his abstract:

Local lists may be divided into two classes: (*a*) geographical lists, or lists treating material collected within a certain definite geographical or political boundary; (*b*) biological lists, or lists treating material collected within a definite faunistic area. For the purpose of studying geographical distributions biological lists are more useful.

With the exception of Coleoptera, Neuroptera, and spiders very little has been done in the way of forming a local list of the insects of the District of Columbia and environs. The following papers are the only ones known which deal wholly with material collected in the above-mentioned locality. From time to time various new species have been described or recorded from this area, but none of these papers deal with this area alone.

A list of the beetles of the District of Columbia. Ulke, 1902. Proc. U. S. Nat. Mus., vol. 25, No. 1275.

A list of Neuropteriod insects, exclusive of Odonata, from the vicinity of Washington, D. C. Banks. Proc. Ent. Soc. Wash., vol. 6, p. 201.

A list of the Araneæ of the District of Columbia. Marx. Proc. Ent. Soc. Wash., vol. 2, p. 148.

The Psychodidæ of the vicinity of Washington. Banks. Proc. Ent. Soc. Wash., vol. 8, p. 148.

List of Conopid flies taken within a five-mile radius of Falls Church, Va. Banks. Proc. Ent. Soc. Wash., vol. 8, p. 106.

New Smynthuridæ from the District of Columbia. Banks. Proc. Ent. Soc. Wash., vol. 5, p. 154.

Notes on some interesting flies from the vicinity of Washington, D. C. Townsend. Proc. Ent. Soc. Wash., vol. 1, p. 224.

To bring the matter before the Society it was suggested that: (1) An advisory committee of three be appointed; (2) a card system should be installed so that records could be made permanent; (3) a definite boundary for the limits of the local list be established. The advisory committee would be necessary as a directing force and to establish uniformity. A 5 by 3 card, ruled so as to have a space for the determiner, locality, date, collector, number of specimens, and disposition of the same, was suggested. Maps were passed around with various radii from the Capitol building drawn so as to give an idea of the area covered by any radius. The 20-mile radius would bring in all the favorite collecting grounds and give plenty of unworked territory. It was suggested that the division of the chosen area into certain smaller faunistic areas would be useful. Thus the swampy area along the Eastern Branch (Anacostia River) might be called S4.

Part of the introduction in a "Guide to the Flora of Washington and Vicinity" (1881) was quoted. The quoted part was that dealing with the comparison of the plants listed in "Floræ Columbianæ Prodromus" (1830), where it is stated that 81 of the plants of the (1830) work, "represent bona fide discoveries of species which either do not occur or are so rare as to have escaped the investigations of the present generation of botanists." It was also stated that to the knowledge of Mr. Heidemann certain species of Hemiptera have become extinct in our local area.

Mr. Pierce remarked that while local faunal lists are of considerable interest from a purely technical standpoint they have a high economic value. In the study of the cotton boll weevil the entomological complex includes all insects acting

as hosts of boll-weevil parasites and then is complicated by the attacks of other insests on these hosts. The presence of certain weeds near cotton fields indicates the presence of typical weevils, with the probability of the usually associated parasites. The abundance of one species of insect frequently involves the reduction of another by direct or indirect means. It is imperative for economic workers to know their local fauna, because the species under investigation are certain to be affected by many other local species.

Mr. Schwarz commented on the importance of publishing, or at any rate of collecting, local lists of insects. Among the multitude of local lists that have been published in North America, many of them are of little interest for the reason that they include only species of wide geographical range. Referring to Mr. Rohwer's plan of working out a faunal list of the District of Columbia insects, Mr. Schwarz said that he was greatly in favor of it, and that if the Society should not take any action he would heartily join the individual efforts of those members who take interest in the subject. Practically all active members of the Society are in the employ of the Government and are living within the city; they are laboring therefore under the difficulty that they can do field work only on Sundays or holidays. Mr. Schwarz alluded to the work done by the "Washington Biologists Field Club," which at its home on Plummers Island, in the Potomac River (about 10 miles from Washington), has done considerable work toward preparing a local list of insects of the District of Columbia.

—Under the heading "Notes and Exhibition of Specimens," Mr. R. A. Cushman spoke on a peculiar habit of the larvæ of two parasitic Hynenoptera. He said:

On May 5, 1911, I found two hibernating larvæ of the codling moth (*Carpocapsa pomonella*) under the bark of an apple tree. In removing them from the bark both cocoons were broken and the larvæ were placed in a glass vial. When observed two days later both had spun cocoons against the glass, but without dimming the glass. This made it possible to observe the larvæ clearly. One of the larvæ was much smaller than the other and of a pasty white color, lacking

the pinkish tinge of the healthy larvæ. On May 11 a small parasitic larva appeared on the surface of this individual, having evidently emerged from its host just previously. This was at about 8 o'clock in the morning. Chancing to observe the parasite a few hours later I was amazed to find that it had in that short period at least doubled in size. By 5 o'clock the parasite larva had at least trebled in size since first observed in the morning and the host had been reduced to a pellet of skin pushed to one end of the cocoon. This rapid enlargement seems to be more in the nature of engorgement than of development. The parasite larva had begun its cocoon on May 12, at 8 a. m., about 24 hours after emerging as a small larva from its host, the adult appearing on the 24th. It was determined by Mr. Viereck as *Ascogaster carpocapsæ* Vier., a braconid of the subfamily Cheloninæ.

A similar habit was a little later observed in the larvæ of a chalcid of the genus *Crotolechus*. On May 18 Dr. C. W. Hooper handed me a living, but sluggish, full-grown caterpillar of *Pyrophila pyramidoides*. This I kept in a vial on my desk for observation. On May 23 the larvæ of the parasites appeared, emerging through the skin of the host, mostly along the sides. At first the parasitic larvæ appeared like very small, shiny, green papillæ or drops, as though the host larva had been repeatedly pricked with a fine point and the juices were oozing out. This illusion was maintained if not intensified as the parasites emerged slowly, and appeared to flow down the sides of the host. From the caterpillar in question about 90 parasitic larvæ emerged. They were, however, very small, and the host remained in much the same condition as a sphinx larva which is covered with the cocoons of *Apanteles* somewhat shrunken but still retaining its form. But by the next morning, perhaps 18 hours later, the chalcid larvæ had increased several times in size and the caterpillar was a mere shriveled skin, only the head shield retaining its original form.

It will be noted that although the two species in which this peculiar habit of engorgement was observed are widely separated systematically, biologically they are alike in at least one respect—both are internal parasites which leave the body of their hosts for pupation. In this feature of their life may lie the explanation of the habit of engorging on the fluids of their hosts, the possible reason being the greater ease of escape from the host for the smaller larvæ.

Dr. Howard expressed great interest in Mr. Cushman's observations. He had often seen the characteristic groups

[illegible]

[illegible]

[illegible] remarked that it would be of much interest to follow up the effect of the very cold weather of the present winter on insect life in the environs of the District of Columbia. Collectors of insects in this territory have noted a more or less intermingling of northern and southern forms, the proportion varying, depending upon the character of the winters during the preceding two or three seasons. Some interesting comments on this point were published by Dr. Chittenden in one of the Bureau of Entomology bulletins issued some years ago.

Dr. Dyar exhibited two papers entitled "Contributions to the Natural History of Lepidoptera of North America, vol. 1, Nos. 1 and 2, by William Barnes, M.D., and J. H. McDunnough, Ph.D. The first paper treats of the Cossidæ of North America, the second of the lasiocampid genera *Gloveria* and its allies. Photographic figures are given of the species treated. Dr. Dyar said that the title was somewhat misleading, as there is no "natural history" as usually understood in the books, the taxonomy only being considered. However, Dr. Dyar

thought that on the whole the publication was to be commended and that the original generic work and tables would prove very useful. The studies appeared to be based on sound lines, undesirable characters in the separation of genera being carefully avoided. The work is privately printed, presumably in small edition, so that it may be liable later to become scarce and difficult of access.

—Mr. Schwarz called attention to a new entomological periodical "Entomologische Mitteilungen," just issued, the organ of the Deutsche Entomologische Museum. The first number gives an interesting account of the difficulties with which the new institution had to contend before its permanent organization was accomplished. Besides the usual number of entomological articles it gives a photographic reproduction of the Deutsche Entomological Museum, which, by the way, is the only public, exclusively entomological museum hitherto built. This museum was founded by the late Prof. Dr. Kraatz and is the property of the municipality of Berlin, Germany, but under independent administration. The leading spirit of this museum is Dr. Walther Horn, the lifelong friend of Dr. Kraatz. He is the well-known authority on the family Cicindelidæ and his visit to Washington will be pleasantly remembered by many of our Society.

—Mr. Pierce stated that he had been interested for about eight years in the subject of insect dispersion. The boll weevil is controlled by the intensity of cotton cultivation. In heavy producing regions the weevils move 5 to 10 miles in a year, but where cotton is less extensively cultivated the movement may be as high as 120 miles. The extensive defoliation of cotton in 1911 by the cotton-leaf caterpillar *Alabama argillacea* brought about a condition in heavy producing areas similar to the normal condition in sparsely cultivated country. As the consequence the weevil moved in the Delta region 50 to 60 miles. Swamp and lake regions may cause the weevils to fly 50 miles before finding cotton. In 1904 the Red River Valley limited the dispersion because of the heavy growth of cotton, which satisfied the weevils.

Mr. Pierce also spoke of barriers to dispersion. Dryness and altitude have proved effective barriers to the boll weevil.

No weevils have been found in the Carolinian Life Zone, although cotton is grown in this zone. Minimum winter temperatures of 12° F. seem to be an effective barrier. If weevils have gone into hibernation they are not affected by tempatures that would kill them if in the open. The minimum fatal temperature varies according to humidity.

Dr. Dyar, speaking of the effect of temperature, stated that it depended in many cases on a minimum rather than average temperature. In this connection he commented on the yellow-fever mosquito and the amount of area it is capable of covering.

MEETING OF MARCH 7, 1912.

The 257th regular meeting of the Society was entertained by Mr. Schwarz in the Saengerbund Hall, 314 C street N.W., on the evening of March 7, 1912, and there were present Messrs. Babcock, Baker, Barber, Caudell, Dyar, Ely, Foster, Gahan, Heidemann, Hyslop, Johnson, Knab, McAtee, Marlatt, Meyers, Pierce, Popenoe, Quaintance, Rohwer, Sandorf, Sasscer, Symons, Vickery, and Viereck, members, and Messrs. N. E. McIndoo, J. R. Malloch, E. Marshall, W. Middleton, W. H. Sill, J. F. Strauss, R. S. Woglum, and W. B. Wood, visitors. President Quaintance occupied the chair.

The minutes of the preceding meeting were read and approved.

Mr. Rohwer read a letter from the Danish "Naturhistoriske Forening," expressing a deep appreciation of the action of the Entomological Society of Washington in sending its Proceedings to their society, and stated that said papers would be filed in the library of the University of Copenhagen. In return, they will forward to this Society copies of their proceedings. Mr. Rohwer also read a letter written at the instance of the Executive Committee to Mr. George K. Burgess, of the Journal of the Washington Academy of Sciences, which reads as follows:

MARCH 10, 1912.

MR. GEORGE K. BURGESS,

Bureau of Standards, Washington, D. C.

DEAR SIR: In replying to yours of the first ultimo addressed to Prof. Quaintance, the Executive Committee of the Entomological Society of Washington request me to inform you as follows: The Entomological Society of Washington publishes a journal known as the Proceedings of the Entomological Society of Washington, in which the minutes and papers are published. In view of the fact that the Society has such ready publication for its minutes, it is not deemed advisable or necessary to submit a copy of the minutes to you for publication. A copy of our Proceedings will be mailed to you, so that you can see our minutes as published.

The matter of special papers has been brought to the attention of the members and they will act as they individually see fit.

A canvass of the Society does not bring anywheres near enough copies of your Journal to secure the offer made the societies, by subscribing to twenty-five copies.

Very truly,

S. A. ROHWER,
Corresponding Secretary.

Mr. Caudell moved that the letter be sent. Seconded by Mr. Knab. Carried.

Mr. E. B. Blakesley and Mr. H. E. Smith were elected active members and Mr. P. H. Timberlake corresponding member of the Society. Professor Quaintance proposed the name of W. B. Wood for active membership and in accordance with the rules it was laid over until the next meeting.

The first paper of the evening, "New American Mites," by Nathan Banks, was read by title.

The second paper, "Diptera at Home on Spider-webs," by Frederick Knab, was read by Mr. Rohwer.[1]

The last paper was "Notes on a Trip to India," by R. S. Woglum.[1]

[1]Not presented for publication.

NEW AMERICAN MITES.

By Nathan Banks.

(Plates I and II.)

The following new species are mostly of some economic value, and will be referred to in economic literature, so I herewith present their description.

Tarsotomus erraticus, new species.

Red. Body two and one-half times as long as broad, in front narrowed and rather roundedly pointed; this narrowed front part bears a number of long, stout, erect bristles, a few shorter, more curved ones on the hind border of body. Palpi stout, the thumb apparently three-jointed, tip of palpus with two approximate curved claws, with crenulated margins, all joints of palpi with stiff, erect bristles. Front legs rather longer than body, third and fourth pairs much longer than body, hind tarsi very slender, all legs with stiff bristles, those on basal joints simple, those on tarsi scabrous or hairy, a pair of long bristles at tip cf metatarsi; about twelve to fourteen joints in the tarsi, the basal ones longer than broad. Length, 1 mm.

From Springer, New Mexico, July 5, on ground (C. N. Ainslie).

Erythræus arvensis, new species.

Red. Body about two and one-fourth times as long as broad, broadly rounded behind; dorsal groove reaching as far back as eyes, and enlarged at each end; one large eye each side, about over coxæ II. Body clothed with short, slightly clavate hairs, all of one kind. Legs with larger simple bristles, but those on the basal joints often curved. Legs shorter than body, first pair about three-fourths the length of the body, patella, tibia, and metatarsus subequal, each longer than femora, and fully three times as long as broad, tarsus about as long as metatarsus, but nearly twice as broad. Hind legs with patella and tibia about equal, the metatarsus rather shorter, and the tarsus only one-half as long as the metatarsus. The thind joint of the palpus has a small tooth on outer side at tip, the fourth joint is concave within, the inner tip pointed and recurved; the thumb is situated in the concavity of the fourth joint; it is about two and one-half times as long as broad, and bears about one dozen bristles near its tip, most of them longer than the joint. Length, 1 mm.

From Salt Lake City, Utah, August 2, swept from alfalfa (Ainslie).

Tenuipalpus cardinalis, new species.

Color, bright red. Body about two and one-half times longer than broad, tapering behind; cephalothorax occupying about one-third of the length; a transverse groove near base of abdomen not reaching across. A pair of long frontal bristles, one each side above second coxæ at the anterior

corner of the cephalothorax, another a short distance behind this, one on the humerus, three each side behind, the first the longest, and one each side at tip, and near this is a short clavate pair. Legs with wrinkled edges; leg I about one-half the length of the body, leg IV scarcely longer than width of the body. Length 0. 35 mm.

From Phoenix, Arizona, on bark of ash tree (Morrill). It is similar in appearance to *T. cuneatus*, but distinct by the large bristles.

Tenuipalpus inornatus, new species.

Yellowish. Body about twice as long as broad, very broad in front, the sides of the cephalothorax nearly parallel, abdomen tapering to the rounded tip; above with two or three transverse lines toward tip; no bristles noticeable on body; the cephalothorax nearly twice as broad as long, anterior margin slightly evenly convex; mandibles large and prominent, palpi short, last joint slender; legs I and II rather stout, sides crenulated, as long as width of the cephalothorax, not crowded up to the beak; hind legs more slender; leg IV reaching to tip of the abdomen; all legs without apparent hairs, except short ones at tips of the tarsi. Length, 0. 3 mm.

From Batesburg, South Carolina, on golden-rod (H. F. Wilson).

Tetranychus longipes, new species.

Yellowish. Body about one and a half times longer than broad; cephalothorax fully twice as broad behind as long; a pair of short bristles in front, and four rows of short bristles on dorsum of the abdomen, none as long as the patella of the hind legs. Mandibular plate rather broad, tip rounded, not emarginate; palpi stout, the thumb shows two fingers, subequal in size, and a hair at each corner. The legs are long, slender, and with few stiff bristles; leg I is longer than the others, plainly longer than the body; leg IV is a little longer than the body, the femora very slightly thickened on the basal part; claws two, simple. Each side of the mandibular plate is a slender curved process, not visible in all specimens. Length, 0.5 mm.

From Springer, New Mexico, September 29, swept from *Agropyron* (a grass) (C. N. Ainslie). Also from Holtville, California, March 25 (Wildermuth).

Evidently related to *T. latus* Can. and Fanz., which occurs on box trees in Italy; however, leg I is still longer than in that species.

Tetranychus pratensis, new species.

Pale greenish. Body nearly or quite twice as long as broad, rather more elongate than usual, broadly rounded behind; without humps above, with the usual four rows of rather long bristles, those above longer than the hind tarsi. Legs short, none as long as the body, with many long hairs, some extremely long, being as long as two joints together. Man-

dibular plate elongate, truncate or broadly rounded in front, but not emarginate. Palpi with short stout thumb, with one stout finger, and a hair at one corner. Tarsi end in two long, simple, and but little curved claws. Length, 0.4 mm.

From Pullman, Washington, on timothy, in June (Hyslop, coll.).

Macrocheles canadensis, new species.

Female.—Pale yellowish, scutum rather darker; dorsum of body with four rows of short, simple, curved spine-like bristles, one at humerus, and about six along the hind margin. Legs quite slender, with long simple bristles; leg I with the last joint a trifle longer than the preceding joint, the antepenultimate joint still shorter; palpi with the last joint bristly all over, other joints with few bristles only near tip, the penultimate joint longer than either the preceding or the apical joint. Second pair of legs about twice as heavy as the others; hind tarsi very long and slender. Ventro-anal plate very broad, broadest much before the middle, truncate in front, somewhat pentagonal in shape. Length, 1.8 mm.

Three from a guinea pig, Ottawa, Canada; sent by Dr. Hewitt.

Histiogaster xylophaga, new species.

Body elongate; in general similar to *H. corticalis*, but differing at once in the absence of long bristles on tarsi and in the smaller bristles on cephalothorax and abdomen. Tarsus I with numerous spines; tarsus II with a large spine on outer side near tip and on inner side with a bristle; tarsus III and IV with only two or three spines. Hind legs much smaller than fore pairs and widely spearated from them; two pairs of fine hairs near tip of the body, and two pairs on cephalothorax, the anterior pair on the front margin; mandibles very large and stout. Length, 0.4 mm.

Burrowing in stems (decayed) of alfalfa at Phœnix, Arizona; sent by Dr. A. W. Morrill. The genus *Histiogaster* is distinguished from *Monieziella* by the presence of spines on the tarsi; moreover, all *Histiogasters* are wood-feeders, while *Monieziella* feeds on dead insects or on scale insects.

Tarsonemus waitei, new species.

Female.—Body (including beak) not twice as long as broad, sides but slightly curved, narrowed behind coxæ III, where there are several long spines on each side, behind this the body is broadly rounded, and below slightly concave, being much thicker at hind coxæ than elsewhere. The beak is very large and prominent, fully one-fourth as long as the body. Legs I and II are very short and stout, leg III slender, leg IV extremely tenuous and ending in two long bristles; all legs have only a very few short, inconspicuous hairs; a long bristle above on each humerus.

Male.—The body is as long as in the female; the leg III enlarged, while the fourth pair are extremely large and long, and end in a very long claw.

Length, 0.2 mm.

From peach buds at West Chester, Pennsylvania. They destroy the terminal peach buds and are thus a serious menace to peach culture.

Phyllocoptes amygdalina, new species.

Body short and thick, about two and one-half times as long as broad, broadest at end of the cephalothorax; a hair each side on cephalothorax in front, and a bristle behind, surface with four nearly longitudinal ridges toward middle, and less distinct one on the sides; legs rather slender; leg I with two bristles on penultinate joint, leg II with but one bristle (the upper) on this joint. Venter with six broad rings before telson; a pair of bristles just behind the vulva, a pair of very long ones farther back and outward, another pair near the middle, and a pair toward tip; a pair of very long bristles from above the telson, and three short ones on each side; a long bristle on coxa of leg II, and the next joint bears a small one. The body above shows about 35 rings; below they are fine and close together; the vulva is emarginate in the middle behind. Length 0.18 mm.

Taken from the tender leaves of the ends of twigs of *Amygdalus davidiana* by Mr. E. W. Rust at Whittier, California, September 29. It distorts, discolors, and curls the leaves of this peach.

OTOBIUS, new genus.

I propose this new name for the *Ornithodoros megnini* Dugés. The indistinct mouthparts and bristly body distinguish it from *Ornithodoros*; its life habits are also distinct.

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EXPLANATION OF PLATES I AND II.

1. *Tenuipalpus inornatus.*
2. *Histiogaster xylophaga*, tarsus I,
3. *Histiogaster xylophaga*, vulva, tarsus IV.
4. *Macrocheles canadensis*, leg II.
5. *Tarsonemus waitei*, legs I and II.
6. *Tarsotomus erraticus*, palpus, and two hairs.
7. *Histiogaster xylophaga.*
8. *Tenuipalpus cardinalis.*
9. *Tetranychus longipes*, palpus, claw, leg I.
10. *Phyllocoptes amygdalina*, cephalothorax, and telson.
11. *Erythræus arvensis*, cephalothorax, tarsus I, palpus.
12. *Phyllocoptes amygdalina*, tarsus I.
13. *Macrocheles canadensis*, leg I, palpus, and hair.
14. *Tarsonemus uaitei*, hind leg of male.
15. *Tetranychus pratensis*, leg I, palpus, claws.
16. *Tarsonemus waitei*, female, venter.

—At the conclusion of the regular papers on the programme, President Quaintance called on Mr. J. R. Malloch, who responded with a few general remarks on systematic entomology in Scotland. Commenting on the insects of this country, he stated that he found an unusually large number showing light colors and bright hues as compared with those of Europe.

—Under "Notes and Exhibition of Specimens," Mr. Marlatt commented on the present status of the quarantine bill and stated that it had now reached a satisfactory stage and would in all probability be made a law during the present session of Congress. He also referred to the action of the governor of California in calling a special session of the legislature for the direct purpose of placing a quarantine on Hawaiian fruits. The purpose of this legislation is to prevent the introduction of the fruit fly, which is now established in Hawaii.

—Mr. J. A. Hyslop gave the following notes from the Pacific Northwest. He said:

The food of *Laropsis*, sp. n., Rowher: While driving through a fallow field at Govan, Washington, on August 24, 1911, I noticed one of these wasps awkwardly traveling over the ground, half flying and half walking. On closer examination it was found to be carrying a locustid with which it was unable to fly. The insects were collected and when submitted, respectively, to Messrs. Rohwer and Caudell, of this Society, for determination, both proved to be new species. The locustid was a species of *Phrixocnemis* as yet undescribed.

Bruchycistis amplus Blake: These mutillids have occured in great numbers each spring of the three years that I have spent in the semiarid Big Bend country of Washington, viz, 1909, 1910, and 1911. At Conell, on April 5, 1910, they were so numerous about lights as to remind one very forcibly of the annual flights of ephemerids in this city. At Govan they were decidedly troublesome, flying into and clogging the lamp chimneys.

Criocephalus productus Lec.: These cerambycids have been extremely numerous during the month of August of the past three years at Pullman, Washington, where they were very troublesome, entering houses and flying about lights in a headlong manner, as do lachnosternas in the east. As many as ten were collected in my room in one evening. These beetles are known to spend their larval stages in *Pinus ponderosa* and are probably brought to Pullman as larvæ and pupæ in cord wood, as the nearest standing timber is 12 miles away.

Olethreutes rubipunctana Kearfoot: The larvæ of this moth were quite numerous in the dry seed-pods of the common iris (*Iris missouriensis*) about Pullman. The larvæ feed on the seed and spin a cocoon within the seed chamber, wherein they hibernate during the winter. Larvæ were collected on March 12, 1910, from which three specimens of the parasite *Ascogaster* sp. n. emerged on May 11 and one more parasite on June 20. In 1911 iris seed-pods containing these lepidopterous larvæ were again collected and on June 15 an adult moth emerged.

Crambus cypridalis Hulst: A remarkable flight of these moths occured at Pullman for three nights, September 23, 24, and 25, in 1911. The moths were so numerous about arc lights that they gave the light the appearance of being enveloped in a driving snow storm.

Aphochantus desertus Coq.: The pupa of this fly was found in the pine-needle mold that had accumulated in a hollow on one of the large bowlders which cap the summit of Moscow Mountain, Idaho. The pupa was collected on July 24, 1910, and placed in some of the extremely dry mold in which it was found, in a box. On August 24 the fly emerged.

Tephritis finalis: The larvæ and puparia of these flies were found in the floral heads of the wild sunflowers (*Balsamorhiza sagittafolia*) at Pullman on May 9, 1910. They always occurred one in a seed capsule and averaged over 6 flies to the floral head, 70 flies having been reared from 11 heads. The flies started to emerge on May 24 and continued emerging until June 2. However, these floral heads were moistened and probably presented abnormal conditions that disturbed the normal appearance of the adults.

—Mr. Pierce stated that he was preparing a treatise on the biologies of North American weevils, including notes also on Central and South American forms. There are important gaps in our present knowledge of these insects and comparatively little is known of the breeding habits of our Otiorhynchidæ and Rhynchitidæ. Any help along these lines which will enable him to work out some of these difficult problems will be appreciated, and, if possible, he prefers to use published records, so that the credit may go to the original observer.

Mr. Pierce also summarized the classification of the temperatures as used in the study of the boll weevil. The various temperatures are grouped into zones in accordance with their effects on the insects, as follows:

	° Fahr.
Lower zone of fatal temperature	5 to 22
Zone of hibernation	22 to 56
Zone of activity	56 to 91
Zone of æstivation	91 to 122
Upper zone of fatal temperature	122 to 140

—Mr. McAtee, commenting on the hibernating insects on Plummers Island, Maryland, stated that numerous specimens of *Bembidium* and *Corythuca*, taken under bark, were brought into the laboratory, but that none had shown signs of life. The following captures were recorded: 60 *Milyas cinctus* were found together under bark of tulip tree and 19 *Pyrellia cyanicolor*, including both sexes, were taken from an ant gallery in an old fallen log. The close packing of the flies and the fact that some had crowded into small parts of the gallery were of interest, as the behavior is in such marked contrast to their love of freedom during summer months.

—Mr. Quaintance commented on the economic importance of a knowledge of temperatures fatal to insects. Important use is being made at the present time in the control of insects in mills by heating the same to a temperature destructive to the common mill species. A most excellent piece of work on this subject is now under way by the Kansas Agricultural Experiment Station, under the immediate direction of Mr. Dean. Sufficient information is at hand to indicate clearly that insects infesting plants may often be destroyed by the use of water heated to a temperature fatal to the insects and not injurious to the plants. For instance, the employment of hot water in dipping nursery stock, grafts, and scions to destroy the common woolly apple-aphis, *Schizoneura lanigera*. The use of hot water in this way dates back many years as well as against the common peach borer, *Sanninoidea exitiosa*. There is need of an extended investigation of the subject, as it appears to offer important possibilities in insect control.

—Mr. A. B. Gahan gave an account of a chironomid fly breeding in well water. He said:

Last fall the writer was requested to investigate a complaint by a resident of College Park, Maryland, that his well water was being rendered unfit for use by the presence in it of numerous small red "worms." Accordingly, an investi-

gation was made, October 4, 1911. The well in question was found to be an ordinary dug well covered with a loose plank platform and containing a pump. It was about 25 feet in depth, partly bricked up and partly woodcased, and situated on a side hill, where it undoubtedly received some surface water, as was evident from the presence in the bottom of the well of a considerable quantity of very fine clay silt such as constituted the surface soil in the vicinity. The water, which was 4 or 5 feet in depth, was reasonably clear at this time, but possessed a very faint odor.

The householder stated that for several weeks he had been compelled to strain the water through a cheese cloth in order to rid it of these worms. Examination of the cloth tied over the mouth of the pump at the time of my visit showed it to contain a dozen or more that had been pumped up during the previous half day. These were readily identified as the larvæ of a chironomid fly.

A second visit to the well on November 15 showed the larvæ still present in about the same numbers, and upon lifting a board from the plank platform a number of small midges were seen to escape. A careful scrutiny of the underside of the remaining boards resulted in the discovery of numerous specimens, eight of which were captured.

On November 23 several additional adults were taken and by means of a dredge net over 50 of the larvæ were secured. Although special effort was made to secure eggs and pupæ, none were obtained, owing probably to the lateness of the season.

The captured larvæ, which were all apparently nearly full grown, were taken to the laboratory and placed in two separate beakers of the well water, about equal numbers of larvæ in each. One beaker contained only the clear water, while in the other a small amount of the fine clay silt from the bottom of the well was placed. When placed in the water they immediately began the peculiar and apparently useless operation, characteristic of chironomid larvæ, of jerking the body alternately from side to side, the tail touching the head first on one side and then on the other. So far as could be observed this movement served no useful purpose, since the insects made no progress forwards or backwards by it. On the contrary, they sank straight to the bottom of the beaker. Here their wiggling was of more avail, as in contact with the glass they were able to move awkwardly about.

Somewhat to my surprise, it was soon evident that those in the beaker containing the clay were not prospering. Their constant wriggling tended to draw them down into the mud, from which they were unable to extricate themselves. At

first it was thought that the larvæ were attempting to conceal themselves, but it soon became evident that this was not the case. The following morning all except three or four of those in this beaker were found to be dead, having apparently succumbed to suffocation.

On the other hand, those placed in the beaker of clear water soon collected a mass of fine débris which they fastened together by means of fine threads, thus constructing a shapeless case within which all concealed themselves. Here they remained alive for several weeks, never voluntarily leaving their hiding place, at least during daylight. Only two of these larvæ were induced to pupate. The first pupa was observed the morning following collection. It was lying flat on the bottom of the beaker and so remained until the emergence of the adult four days later. When disturbed it would display some feeble movement, but at no time was it active. The second pupa was formed within the above-mentioned case. In neither case was the act of emergence observed.

The principal feature of interest in connection with this species is the unusual habitat. Species of *Chironomus* are known to breed in lakes, sometimes at great depths, in stagnant pools and ponds, and even in running water, but this is the first instance known to the writer of a species being known to breed in a closed well. The larva is of the type possessing two pairs of blood gills, is blood-red in color, due according to Miall to the presence of hæmoglobin, and is thus adapted to living in deep water instead of at the surface. That the larvæ in question do in fact live at the bottom of the well is shown by their behavior in the beakers, where they were under almost constant observation for over two months, and were never seen to rise near the surface. This habit of deep living accounts for their being brought up by the pump, the screen of which is near the bottom of the well.

Specimens of the adults were sent to Prof. O. A. Johannsen, Orono, Maine, who has kindly identified them as *Chironomus dorsalis* Meig.

It is not probable that the presence of these insects in the water has any considerable deleterious effect in itself. Rather is it believed that their presence is an indication of contamination from other sources. Their presence, however, is in no way desirable in water intended for household purposes, and should the habit of breeding in wells become general, it will present a problem of some economic interest.

Dr. Dyar said that the presence of the larvæ in the well was probably induced by the wooden walls, which would furnish

food. He thought no larvæ would be found in the wells entirely lined with stone, as is ordinarily the case.

Mr. Knab stated that the idea that the red color of chi ronomid larvæ indicated that they inhabit deep water is erroneous. He had on several occasions found large colonies of such blood-red chironomid larvæ in very shallow water and evidently thriving.

The following papers were accepted for publication:

THREE SPECIES OF NOCTUIDÆ NEW TO OUR LISTS.

BY HARRISON G. DYAR.

Micrathetis dasarada Druce.

Thalpochares dasarada Druce, Biol. Cent.-Am., Lep. Het., II, 498, 1898.

Micrathetis dasarada Hampson, Cat. Lep. Phal., VIII, 444, 1909.

Somerville, South Carloina, April, 1899 (R. Ottolengui).

Gonodes liquida Möschler.

Ipimorha liquida Möschler, Abh. senck. Ges., XIV, 48, 1886.

Cyathissa violascens Schaus, Trans. Am. Ent. Soc., XXI, 225, 1894.

Drobeta leada Druce, Biol. Cent.-Am., Lep. Het., II, 494, 1898.

Gonodes liquida Hampson, Cat. Lep. Phal., VIII, 452, 1909.

Stemper, Hillsboro County, Florida, September 19, 1911 (F. Marloff).

Pacetes devincta Walker.

Abrostola devincta Walker, Cat. Brit. Mus., XV, 1781, 1858.

Orthoclosteria peculiaris Butler, Trans. Ent. Soc. Lond., 70, 1878.

Ingura murina Druce, Biol. Cent.-Am., Lep. Het., I. 326, 1889.

"Florida" (Schaus collection); Stemper, Hillsboro County, Florida, September 15, 1911 (G. Marloff.)

A NOTE ON COLORADIA.

BY HARRISON G. DYAR.

In describing *Coloradia lois* (Proc. Ent. Soc. Wash., XIII, 89, 1911) it now appears that I misidentified the form *doris* Barnes. Dr. Barnes, recently on a visit, showed me a photograph of his type *doris*, which is undoubtedly the same as *lois*. This leaves the other form unnamed. It may be called *loiperda*, n. var. Similar to *pandora* Blake, smaller, the hind wings whitish in ground and nearly without red tint; fore wing more densely irrorated with white.

Four males, one female; Colorado; the only specimen bearing exact locality is from Glenwood Springs (W. Barnes).

Type: No. 14500, U. S. National Museum.

DESCRIPTION OF AN INJURIOUS OTIORHYNCHID.

By F. H. Chittenden, Sc D.,

Bureau of Entomology, U. S. Department of Agriculture.

In cataloguing the Rhynchophora of the United States National Museum in a paper entitled "Studies of North American Weevils," the author, Mr. W. Dwight Pierce,[1] mentions a species of otiorhynchid weevil, under the genus *Phacepholis*, designating it as "*Ph. viridis* Chittenden," stating that it is the most brilliant green form of the genus, mentioning the type locality (San Antonio, Texas), and date of collection (May 21, 1900), with the added statement that it was found on fruit trees, and placing it as a synonym of *Phacepholis elegans* Horn.

In a supplement to their article on the Rhynchophora of Central America, Dr. D. G. Sharp and Mr. G. C. Champion,[2] again using the writer's name as authority for this species, mention structural characters—the much more prominent eyes and the very convex acuminate-ovate elytra, and figure the species, too lightly colored.

FIG. 1 —*Pantomorus viridis*. Female, much enlarged. (Original.)

The danger of using manuscript names and the confusion that results as a consequence is well exemplified in the present species. It leaves a question as to who first described the species—Mr. Pierce, who attempted to sink the writer's MSS. name as a synonym, or Sharp and Champion, who point out two structural characters, and figure the female, which also indicates characters. Since the published statement has been made that the writer will shortly publish a description, the following is submitted. The species is removed to the genus *Pantomorus* Schœnh.

[1] Proc. U S. Nat. Mus., No. 1708, vol. 37, p. 361, Dec. 11, 1909.

[2] Biologia Centrali-Americana, vol. IV, pt. 3, p. 336, pl. 15, figs. 22, 23, *a*, Dec., 1911.

Pantomorus viridis Sharp and Champion.

Phacepholis viridis Chittenden (MSS), Pierce, Proc. U. S. Nat. Mus., vol. XXXVII, p. 361, 1909.

Pantomorus viridis Chittenden, Sharp and Champion, Biol. Centrali-Americana, vol. IV, pt. 3, p. 336, figs. 22, 23, December, 1911.

Female.--Robust pyriform with elytra strongly convex; elytra and thorax densely coated with brilliant metallic green scales, the thorax more sparsely covered and with the scales mostly larger and with a bluish cast. Head broad, eyes nearly round and prominent. Thorax nearly as long as wide, sides strongly arcuate. Head, lower surface and legs coated with pale pinkish scales. First joint of funicle of antenna about half as long as second, second longer than next three together.

Male.--Body much narrower. First funicular joint about one-third as long as second.

Length, 5.5 to 6.5 mm.; width, 2.5 (male) to 3.4 mm.

Habitat: San Antonio, Texas (type locality), where it was reported injurious to peach, plum, and pear, May 21, 1900; Guanajuato and "Sierra de Durango," Mexico (Champion).

Type: No. 9756, U. S. National Museum.

The wider head, rounded, prominent eyes and antennal structure distinguish this species from *elegans*. A fairly large series of each shows such variability that other constant structural characters cannot be readily seen. The colors are very nearly constant in the present species and the basal margin of the thorax (which varies in length) is usually distinctly reflexed. It is larger than *elegans* and the female is much more robust than our other species. In *elegans* the second joint of the funicle is usually shorter than the next three together.

Finally, it should be added that it is *not* nearly related to *elegans*, but is similarly colored.

RECORD OF THE FINDING OF A TRUE QUEEN OF TERMES FLAVIPES KOL.

By Thomas E. Snyder,
Bureau of Entomology, U. S. Department of Agriculture.

(Plate III.)

While investigating damage by wood-boring insects to the bases of telegraph and telephone poles, a true fertilized queen of the species *Termes flavipes* Kol. was found in the butt of a chestnut telegraph pole on August 12, 1910. The pole was standing on the right of way of the Seaboard Air Line R. R. about 3½ miles southwest of Portsmouth, Virginia. The soil was sandy and dry near the surface.

The true queen (pl. III, *a*) when found was inactive in a gallery no wider than her abdomen, probably a burrow of

Lymexylon sericeum Harr., in the outer layers of the wood, below the surface of the ground. Injury by termites to this pole was confined to the outer layers of the wood, where there was incipient decay. Apparently she was unattended. On being exposed to the sunlight her abdomen appeared to have a greenish tinge. This queen is approximately 14 mm. in length. The queen had been fertilized, as is shown by the distended abdomen. Wing stubs were present.

On the same day a supplementary queen (pl. III, *b*) was found in the butt of another chestnut telegraph pole nearby. Termites had mined the heartwood to a depth of from 2 to 4 inches in from the exterior in this pole. This queen was active and was associated with workers; all were moving apparently to escape the light as the mines were laid open by the axe. She was in the outer layers of the wood, where there was incipient decay. This queen is approximately 12 mm. long.

The head, thorax and scutellar area of the abdominal segments of the true queen are more heavily chitinized and deeply pigmented. The supplementary queens never have developed wings and lack the deeper pigmentation (pl. III, *a*) of the chitinized parts and the ocelli are not so prominent as in the true queen--indications that the supplementary queens never leave the colony..

A small scarabæid (*Valgus canaliculatus* Fab.) was found very abundant in termite colonies in decaying oak stumps near Rock Creek Park, Maryland.

NOTE.—A study is being made of the more common Americantermites of the genus *Termes* with a view of determining methods of preventing injury by them to various classes of forest products. Any additional records of the conditions under which queens have been found in the past will be of value. It is believed that this is the first fertilized true queen ever found of this species.--T. E. S.

BLOOD-SUCKING AND SUPPOSEDLY BLOOD-SUCKING LEPTIDÆ.

(Diptera.)

BY FREDERICK KNAB.

Recently Prof. C. F. Baker sent in for determination a specimen of the family Leptidæ, taken by Mr. David L. Crawford in the State of Oaxaca, Mexico, and accompanied by the statement from the collector that it "is a fierce biter and blood-sucker." The specimen proved to be a female of *Atherix longipes* Bellardi, a species not again recorded since described and not represented in the National Museum collection.

The observation is new, and with the wide attention now being given to the blood-sucking habit in insects, of considerable

interest. While a number of species of Leptidæ of other genera have been reported as blood-suckers, these records are so few and scattered, and some of them of such a questionable character, that it seems worth while to bring them together and review our present knowledge of the blood-sucking habit in the Leptidæ.

In Europe *Leptis scolopacea* and *L. strigosa* have been reported as attacking man. In North America we have the record of Osten Sacken, who observed the habit in an undetermined species of *Symphoromyia* at Webber Lake, California, and made the statement that the female stings painfully and draws blood.[1] For South America we have the single record by Philippi of the habit in *Dasyomma obscurus* from Chili. "Frequens in prov. Valdivia, mensibus Decembri et Januario, avide sanguinem rostro petit." [2]

Thus it will be seen that our information concerning blood-sucking Leptidæ is extremely meager, and confined, at least for the most part, to single records for each species. Furthermore, the European records may be confidently eliminated, as they are undoubtedly erroneous. They have been discussed by the late G. H. Verrall, an exceedingly careful worker, as follows:

> I cannot accept the records of the bites of *Leptis scolopacea* and *L. strigosa* as recorded by MM. Heim and Leprevost in Bull. Soc. Ent. France, LXI, and clv. (1892); to begin with, neither gentleman is well known in Dipterology, and in each case only one specimen was observed; M. Heim's specimen was first recorded as *L. scolopacea* but subsequently altered to *L. strigosa*, while M. Leprevost did not attempt to name his specimen but stated that it was named by M. Gazagnaire, whose name again is not known in Dipterology; I cannot help thinking that the aggressive appearance of *Leptis* led these gentlemen to believe that a species of that genus caused the bites which had been really given by *Hæmatopota*, as the bites of the latter cause in me the exact symptoms detailed; I would further remark that the status of *L. strigosa* is eminently uncertain and that it would require a very first-rate Dipterologist to identify that species or variety.[3]

Verrall's criticism is supported by the structure of the mouthparts of *Leptis*. Becher studied the mouthparts of several Leptidæ and his investigations show that both sexes of *Leptis* and *Chrysopila* agree in structure with the male of *Chrysops* (Tabanidæ) and lack the mandibles.[4]

On the other hand, Becher shows that the females of *Atherix* and *Symphoromyia* have fully developed mandibles, like the female Tabanidæ.

Regarding our American records, then, the structure of the mouthparts supports the observations in the case of

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[1]Bull. U. S. Geol. Survey, III, p. 224, 1877.
[2]Aufzähl. d. chilen. Dipteren, Verh. zool. bot. Ges. Wien, XV, 725, 1865.
[3]British Flies, vol. 5, p. 235, 1909.
[4]Denkschr. kais. Akad. Wiss. (Wien), Math.-Naturw. Classe, vol. 45, p. 143-144, 1882.

Atherix and *Symphoromyia*. It is easily conceivable, from what we know of other groups of blood-sucking Diptera, that the habit is restricted to certain species of those genera. In the case of *Symphoromyia* it appears somewhat strange that no further records have appeared, as some of the species appear to be fairly common in the far west. This, however, is probably attributable to the fact that the statement of so eminent an observer as Osten Sacken has been generally accepted. In the case of the Chilean *Dasyomma* it is not strange that, in a country so poorly known entomologically, Philippi's observation, should it be correct, has not been confirmed.

In the case of the *Atherix* from Mr. Crawford, some doubt arose in my mind from the superficial resemblance of the specimen to certain of the more slender Tabanidæ, certain *Chrysops*, and *Dichelocera*. This doubt was strengthened when I examined the South American Leptidæ in the Museum collection and found that, of two specimens sent in by E. C. Reed as *Dasyomma cinerascens*, one, and the one bearing his original label "*Trichopalpus cinerascens*," is a tabanid. On a statement of the unsatisfactory character of our records Mr. Crawford kindly sent me the following communication, which leaves no room for doubt that *Atherix longipes* is a genuine blood-sucker.

In regard to the blood-sucking Leptid, *Atherix longipes*, I am *very sure* of my statement that it was that and not a Tabanid which I caught thus. There were a large number of the flies which attacked both me and my horse in the mountains a few miles back of Oaxaca. The bite was *exceedingly* painful and caused more alarm among the horses in my outfit than any other fly. I was so interested in a blood-sucker, which apparently was not a Tabanid, that I put a number in a separate killing-bottle, taking them all in the act of biting either me or my horse, and when I pinned them I took special pains to append a note on the pins. So you see I am positive beyond a *chance* of mistake. Moreover, there are no *Chrysops* or *Dichelocera* from Oaxaca in my collection—so I am doubly sure!

The occurrence among the Leptidæ of isolated species with the blood-sucking habit is not so surprising when one considers that the flies of this family are reported to be predaceous upon other insects. From piercing the integument of an insect to puncturing the skin of a warm-blooded animal is but a step. Besides, similarly, isolated cases occur in other families of Diptera among the species which have mouthparts fitted for piercing and sucking. Thus, in the family Blepharoceridæ, in which the females are generally so organized, the predaceous habit is general, while a single species (*Curupira torrentium* F. Müller) is an habitual blood-sucker. Again, in the family Chironomidæ, subfamily Ceratopogoninæ, there are species which attack other insects to suck their juices, while certain others are well known for their attacks on the higher animals.

Actual date of issue, June 19, 1912.

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON.

VOL. XIV JULY - SEPTEMBER, 1912. No. 3

SPECIAL MEETING OF MARCH 14, 1912.

A special meeting of the Society was held in Room 2, Bureau of Entomology, U. S. Department of Agriculture, to take action on the death of Dr. John B. Smith.

President Quaintance occupied the chair, and there were present Messrs. Barber, Blakesley, Currie, Heidemann, Hopkins, Howard, Hyslop, Johnson, Middleton, Phillips, Popenoe, Quaintance, Rohwer, Russell, Sasscer, Seigler, Simaton, Walton, Webster, Wood, and Zimmer.

President Quanitance appointed a committee of three, consisting of Messrs. Howard, Hopkins, and Webster, to draft suitable resolutions, which were to be sent to the family of the deceased and printed in the Proceedings of the Society. The committee reported the following resolutions:

Whereas, the Entomological Society of Washington has learned with the deepest regret of the death of its former active member and most highly esteemed corresponding member, Dr. John Bernhard Smith;

And whereas, Doctor Smith had been closely connected, both personally and by correspondence with Washington entomology for a quarter of a century;

And whereas, by his admirable work and strong personality he had long since gained the respect and esteem of the members of the Society: Therefore, be it

Resolved, That in the death of our former member the Society has lost one of its valuable assets; American entomology has lost one of its foremost workers; the State of New

Jersey has lost an earnest, indefatigable, far-sighted, and most competent official;

Resolved further, That the Entomological Society of Washington extends to the widow and the family of its late member its warmest sympathy, and at the same time its appreciation of the fact that the distinguished career of the late husband and father must always be a source of satisfaction to those left behind.

L. O. Howard,
F. M. Webster,
A. D. Hopkins,
Committee on Resolutions.

Doctor Howard made the following remarks:

Another of the founders of the Entomological Society of Washington, Dr. John Bernhard Smith, has died, passing away yesterday morning at 3 o'clock after a long illness. His end was probably due to chronic heart trouble complicated by Bright's disease.

Our former colleague was born November 21, 1858, in New York City, and was educated in the schools of New York and Brooklyn. He was admitted to the bar in 1880 and practiced law in Brooklyn between 1880 and 1884. He became special agent of the then Division of Entomology, Department of Agriculture, in 1884, and for two years he did field work, especially upon insects affecting the hop and cranberry. In 1886, he was made aid in the Division of Insects, U. S. National Museum, holding this position for four years. In 1890, he was made entomologist of the agricultural experiment station of the State of New Jersey, and was made State Entomologist of New Jersey some years later.

I have never learned, and I don't think he ever told me, just when he began to collect insects and to become interested in entomology. I imagine that Charles Fuchs and Frank Schaupp had something to do with it. At all events, they were all together in the early days of the Brooklyn Entomological Society. Doctor Smith became the second editor of the bulletin of that society, which he afterwards developed into Entomologica Americana, and of this later well-known journal Dr. Smith was editor from 1886 to 1890, when he was succeeded by Dr. F. H. Chittenden. His interests from the start were in the Lepidoptera, and this interest continued the rest of his life, and he became, as every one knows, one of the best known workers on the great complex known as the Family Noctuidæ.

His first introduction into economic entomology came in 1884, when Dr. Riley brought him to Washington, but his work in 1886–1890 was again purely systematic. During his six years in Washington he became a well known figure among the naturalists of the city, and was at one time secretary of this Society, and later, secretary of the Biological Society of Washington.

When the agricultural experiment stations were founded, he was one of the first State workers appointed, and from the very start his energy and capacity made him one of the foremost workers in this line of research. He was interested in and active in every new development of economic entomology and was a prominent figure at every meeting of the Association of Economic Entomologists, holding the office of secretary at the first and second annual meetings of the association, in 1889 and 1890; second vice-president in 1893; first vice-president in 1894; and president in 1895.

He carried on his dual work as a systematic entomologist and as an intensely practical economic entomologist down to within a short time of his death. He was not only held in great respect among the entomologists of this country and of Europe, but he had the highest standing among the citizens of the State of New Jersey, of which he was an official. Further, he had the respect and confidence of the citizens of New Brunswick, in which city he lived, and of the faculty and student body of Rutgers College, with which he was connected and which had given him, in the early nineties, the honorary degree of doctor of science.

While practically all of Doctor Smith's work was sound and deserving of every respect, it seems to me that the triumph of his life was in the results obtained by his anti-mosquito work. I can do no better than to quote from my address before the Seventh International Zoological Congress as follows:

> The mosquito destruction measures carried on by English workers, and especially by those connected with the Liverpool School of Tropical Medicine, in different parts of the tropics controlled by England have been largely scale work of great value. That done by the army of occupation in Cuba was of enormous value so far as the city of Havana was concerned, and an assistant just returned from the Isthmian Canal Zone assures me that it is possible to sit now out-of-doors of an evening upon an unprotected veranda anywhere in the Zone without being annoyed by mosquitoes and without danger of contracting malaria or yellow fever.
>
> These are all great pieces of work, but when we consider the conditions that exist in the State of New Jersey and the undertaking and successful work of Doctor Smith in the handling of the most difficult problem of the

species that breed in the salt marshes, and of his persistent and finally successful efforts to induce the State legislature of that wealthy but extremely economical State to appropriate a large sum of money to relieve New Jersey from its characteristically traditional pest—we must hold up our hands in admiration.

One important lesson learned from Doctor Smith's successful career is that it is possible for a man of adaptability, of force of character, and of keen perception, without university training and without any training in biological research, to take up both systematic and economic entomology after reaching manhood and to become in the course of a short life one of the prominent men of the Nation.

It is a sad and curious coincidence that both Charles V. Riley and John B. Smith died at the same age.

Doctor Howard made some additional remarks and quoted a letter from Dr. Smith, dated February 23, 1912, as follows:

DEAR DOCTOR HOWARD: Yours of the 10th inst. is at hand. No, it is nothing serious. It only means the preliminary to a funeral, and that is one of the commonest things that occurs.

Professor Webster made the following remarks:

I think it must have been about 1885 that I first began cort responding with John B. Smith, and I remember well his firsletter, and remarked at the time its hearty spirit of comradeship. While I did not meet him until a number of years afterwards, that same spirit was true of him all of his life. Dr. Smith never was too busy to help anybody. You might go to him when he was in the midst of his work and he would drop everything and try and help you; I have always noticed, too, that, in all of our entomological associations and societies, Doctor Smith was always ready to take hold and work, and worked like a Trojan. It has always been a wonder to me how one man could accomplish so much; how he found time to even try to do some of the things that he did. Of course in a man so prolific, it would be almost beyond human endurance for him to be always exact. Sometimes we would get out of patience with him over his mistakes and tenacity in holding to them, yet could not stay out of patience any length of time. Of course, the work that he did will be revised, and more or less, perhaps, dropped out, which is true of all of us; but after all error is sifted out, though cut off in his prime, there will be a good life's work left. I do not believe I can say anything more than that he will be sadly and universally missed, ex-

cept to emphasize his universal good nature and his willingness to aid everybody in any way and he never seemed to be too busy to do so.

Doctor Hopkins made the following remarks:

To my personal knowledge I first had correspondence with Doctor Smith immediately after taking up work in the West Virginia Experiment Station in 1890. Directly after Doctor Smith had been appointed to New Jersey, I had been studying some insects, especially those found on hackberry, mulberry, and raspberry. I had made some drawings that I thought were very good, but after seeing some drawings made by Doctor Smith, I sent them to him for his criticisms, and he was very severe in his criticism. He said they were not worth reproduction and they were very poor, and his exceedingly frank expression attracted me, and I may say that it had some influence, because I made up my mind then that I would make as good drawings as Doctor Smith. It was my pleasure some four or five years after that, at one of the annex meetings, I think at New York, of the association in 1894, at which Doctor Smith was exhibiting some of his drawings of the clerid that I introduced from Germany, and after he had exhibited his drawings, I passed mine around, and he complimented me especially on the excellent work, and I called his attention to the fact that this was one time that he did not criticize my drawing, so that sometimes one does good by having his work criticized, and I think that his criticism did a great deal towards my attitude to do some good drawing. This is, I think, one of the instances which might be worth mentioning. At our meetings of the American Association, Drs. Smith and Fletcher and a few others were always the remaining members of the annex meeting, and will always be remembered with great pleasure.

Mr. H. S. Barber made the following remarks:

I had the great pleasure of being out in the country one full day with Dr. Smith and Mr. Schwarz, and the way they seemed to enjoy each other, after a long separation, was one of the prettiest things I ever saw in my life. Both of them were just overjoyed all the time. It was one of the pleasantest outings I ever had.

Mr. Quaintance made the following remarks:

I would merely say that I first met Doctor Smith, I think, at the Columbus meeting of the American Association, and

indorse thoroughly what Professor Webster said as to his extremely good nature, and I used to think a great deal of him, and the more I knew of him personally, the higher opinion I had of him as a man. I think I had correspondence with him first, perhaps, in 1893, in connection with the determination of some common noctuid moths from Florida. They were all very common and I should have known what they were, but I had just began the study of insects at that time and he let me down very easy. They represented the bollworm moth (*Heliothis*) and perhaps the cabbage worm and similar insects like that. I am sorry that I have not his letter to read to show you how nicely he treated me in regard to the matter, being a beginner in the subject. On another occasion, Doctor Hopkins' remarks about drawings remind me of an experience I had in that particular. I had made certain observations on a little weevil which infests seed corn, and not knowing how to make drawings, I made them very large. Dr. Smith at that time was editor of the section of entomology in Entomological News devoted to economic entomology. I sent them on to him with the manuscript and he complimented me on the paper. He said "Why did you make your drawings so large? They are enormous." He offered to redraw them and reduce them, which he did.

Mr. Currie made the following remarks:

I never was associated with Doctor Smith to any extent, but at the times when he visited Washington and the National Museum in former years I always enjoyed meeting him greatly and I admired him for his cordial personality and abounding enthusiasm. I always admired the records of the work that he left in the Division of Insects in the National Museum. In the old record book, in which the first accessions to the Division of Insects in the National Museum were made, we have the entries made in Doctor Smith's own handwriting. The amount of work that he evidently did was quite remarkable. While he was Assistant Curator of the Division of Insects he accomplished much work in arranging various groups and did considerable work on the exhibition series in various groups. I suppose that at that time he was about the only one employed at the National Museum to care for the insect collections. He was succeeded later by Mr. Martin L. Linell. Those were the days when one man had to take charge of a great variety of groups and the arrangement of them, and had many duties. Of course, his most notable systematic work was perhaps that in connection with the collection of Noctuidæ, and even after

he left Washington specimens of his new species were constantly being added to the collection. He sent the new specimens or species themselves or, if that was not possible, he saw to it that photographs or drawings were put in place in the collection, so that the series would be as complete as it was possible to make it.

After the resolutions were adopted, the meeting was adjourned at 4.30 P. M.

The following papers were accepted for publication:

A NOTE ON THE SOUTHERN WALKING-STICK (ANISOMORPHA BUPRESTOIDES STOLL) AND A TACHINID PARASITE.

By H. M. Russell.

Bureau of Entomology, U. S. Department of Agriculture.

While at Cutler, Florida, May 8, 1908, the writer captured a pair of walking-sticks in copulation belonging to this species. They were placed in a tin box and left until May 12, when upon opening the box to kill the female it was found that 10 eggs were lying loosely upon the bottom. The female when grasped expelled a milky fluid possessing a very disagreeable odor in a very fine mist from some part of the abdomen, repeating this as often as handled, although the quantity diminished each time.

The egg is 4 mm. long and 2 mm. in diameter, shaped exactly like a bean, both ends flattened and one side with a scar in the side similar to one on a bean where it is attached to a pod; anterior pole with round cap fitted so as to open when larva pushes on it; color gray, cap with blackish spot in center, scar on side black, surface with few raised wavy lines running lengthwise and between a number of very minute raised wavy lines.

Five dipterous pupæ were also found in the box, which must have come from the female, although the parasitism did not prevent her from laying the eggs.

May 29, 1908, a male fly, a tachinid, emerged from one of these pupæ, and was described as *Phasmophaga meridionalis* by Mr. C. H. T. Townsend, in the Annals of the Entomological Society of America, vol. 11, p. 224, 1909.

A CONTRIBUTION TO NORTH AMERICAN DIPTEROLOGY.

By Harrison E. Smith,

U. S. Bureau of Entomology, Melrose Highlands, Mass.

In the following paper are included the descriptions of several new species of North American Tachinidæ and Syrphidæ; also a summary of the North American representatives of the genus *Hyperecteina* Schiner. I am under obligations to Mr. Frederick Knab and Mr. C. W. Johnson, each of whom very kindly offered much valuable advice and criticism; also to Dr. L. O. Howard, who made possible my opportunity to examine many of the types for comparison.

Family SYRPHIDÆ.

Helophilus willingii, new species.

Eyes and arista bare; third antennal joint oval; head, thorax, abdomen and legs shining black in ground color. Length 11 to 12 mm.

Male and Female.—Front in the male about one-half as wide as, in the female nearly as wide as either eye; in the male pile on the upper half of the front black, on the lower half grayish white; in the female black pile on the front, descending a little below the upper half; vertex shining black, very thinly dusted gray pollinose; face on the lower half produced obtusely downward and forward into a cone, shining black, densely grayish-white pollinose on the sides and bearing pile of a similar color along the margins of the eyes; beneath the antennæ concave for a short distance and then nearly straight to the tip; in the middle of the face extending from the tip of the epistoma nearly to the base of the antennæ a moderately broad shining black stripe; epistoma on the ventrad shining black; cheeks below the eyes narrow, dull black, grayish pilose; first two joints of antennæ shining black; the third joint brownish black, dusted gray pollinose; shining brownish black just above the base of the antennæ; arista brown; thorax shining black, the usual lateral stripes rather indistinct gray; in the female two velvety black spots at the tip of each mesothoracic suture; pile of mesonotum grayish; scutellum shining black, gray pilose; pleuræ also shining black and densely grayish pilose; abdomen oval, shorter than the wings, wholly shining black, sparsely grayish pilose, except the dorsad of segment 3 and the basal margin of segment 4, which are mostly covered with very short black pile; legs shining black, the tip of femora and the base of tibiæ faintly brownish; pile in most reflections grayish and black; on the tarsi ochraceous in some reflections; pulvilli and the tarsal claws on the basal two-thirds yellowish; tips of the tarsal claws black; wings in the male subhyaline; in the female slightly smoky tinged; the veins and stigma brownish; sixth longitudinal vein gently curved; calypteres whitish.

Described from 1 male collected June 19, 1905, and 1 female collected July 8, 1906; both from Regina, in the Saskatchewan region, Canada; both specimens collected by Mr. T. N. Willing, after whom the species is named.

Type: No. 14695, U. S. National Museum.

Chalcomyia cyaneus, new species.

Dark metallic blue, shining, very sparsely clothed with short grayish pile; eyes and arista bare; dichoptic species. Length 7 to 8 mm.

Male.—Eyes moderately separated; front metallic bluish black, shining, sparsely grayish pilose on the vertex, a narrow obsolete cross-band near the middle; antennæ situated upon a strong conical projection, the first two joints short, the first joint blackish, the second and third light brownish; the third joint orbicular; arista basal, bare, dark brown; margin of the antennal process at base of antennæ reddish brown; face below the antennal process concave, very moderately tubercular near the middle, produced a little below the eyes; middle of the face, epistoma on the under sides, and the cheeks shining metallic blue; a grayish white pollinose stripe runs from the eyes obliquely to the oral margin; the mesonotum, scutellum, and the pleuræ shining metallic blue, very sparsely gray pilose; scutellum moderately large and projecting, the outer angles rounded, faintly shallow grooved on the disk; abdomen oval in outline, somewhat flattened, shining metallic blue, very short grayish pilose, longer on the lateral margins in front; legs rather stout, dark brownish black, shining; extreme tip of femora and base of tibiæ reddish brown; hind femora moderately thickened; pile on the under sides of hind tarsi golden in some reflections; wings subhyaline, faintly yellowish tinged, the third and sixth longitudinal veins nearly straight, anterior cross-vein oblique, situated before the middle of the discal cell; subcostal cell from slightly before the tip of the auxiliary vein to the costa yellow; calypteres white.

Described from two male specimens taken at Franconia, New Hampshire, by Mrs. A. T. Slosson.

Type: No. 14696, U. S. National Museum.

FAMILY TACHINIDÆ.

Phorocera einaris, new species.

Thorax, legs and abdomen black, dusted with pollen. Length, 11 to 14 mm.

Eyes densely pilose; front in the male about two-thirds, in the female about five-sixths as wide as either eye; frontalia opaque black; parafrontals densely yellowish gray pollinose; the parafacials, cheeks, and occiput densely dusted gray pollinose, sometimes nearly all the pollen of the head is faintly tinged with yellow; front in the male projecting about two-thirds, in the female about one-half the horizontal diameter of the eye as viewed from the side; frontal bristles descending to or slightly below the apex of

the second antennal joint, the 3 uppermost frontal bristles in the male stout, recurved, and of equal length, in the female the penultimate bristle is only two-thirds the length of the other two; frontal bristles below the base of the antennæ curving upwardly; parafrontals outside of the frontal row covered with many black hairs, 2 pairs of strong proclinate orbital bristles present in the female; ocellar bristles long, proclinate; vibrissæ on a level with the front edge of the oral margin; facial ridges ciliate on the lowest two-thirds to four-fifths, the bristles long, reclinate; antennæ black, dusted grayish white pollinose; the third joint in both sexes at least four times as long as the second, its greatest width equal to the length of the second antennal joint; arista one and one-half times as long as the third antennal joint, thickened on the basal one-fifth to one-fourth, the penultimate joint longer than broad; cheeks caudad of the vibrissæ each bearing a row of black macrochaetæ near the oral margin, the remainder covered with many black hairs, about one-fifth as broad as the eye height; sides of face each one-fifth as wide as the median depression; palpi reddish yellow, robust, and slightly spatulate.

Mesonotum black, appearing when viewed from behind densely yellowish-gray pollinose, the pollen appearing at its greatest density along the anterior margin and upon the humeri, distinctly vittate; four pairs of postsutural and three pairs of postacrostichal bristles; pleura dusted gray pollinose; two sternopleural bristles; scutellum brownish on the apical half, dusted with pollen, bearing a strong pair of discal macrochaetæ and four pairs of long marginals, the apical pair cruciate; legs shining black, gray pollinose; the middle tibiæ each bearing two macrochaetæ on the front side near the middle; hind tibiæ ciliate or subciliate; tarsal claws and pulvill-elongate in the male, short in the female.

First abdominal segment black; the second and third segments grayish-white pollinose on the anterior two-thirds, the posterior third shining black; the fourth segment shining black except on the sides, which are densely gray pollinose; first and second segments each bearing a pair of marginal macrochaetæ; the third a marginal row and the fourth a discal and marginal row and many shorter bristles intermingled on the apical two-thirds; along the ventral median of the female a row of black macrochaetæ.

Wings hyaline, faintly tinged with yellow at the base and along the costa; the third vein usually bristly one-half to two-thirds the distance from the base to the small cross-vein; the fourth vein beyond the bend concave; the small cross-vein distinctly before the middle of the discal cell; posterior cross-vein sinuous; calypteres whitish, faintly bordered with yellow.

This species differs from *Phorocera tortricis* Coq. as follows: *P. tortricis* is a smaller species, the hairs of the abdomen are suberect, and the third vein bears only two bristles at its base; none of these characters are true of *P. einaris*. *P. einaris*

differs from *Phorocera claripennis* Macq., which it closely resembles in appearance, as follows:

P. einaris.	*P. claripennis.*
Bend of fourth vein not distinctly long appendiculate. Scutellum bearing a strong pair of discal macrochaetæ.	Bend of fourth vein distinctly long appendiculate. Scutellum usually not bearing a pair of discal macrochaetæ.
Middle tibiæ each bearing two macrochaetæ on the front side near the middle.	Middle tibiæ each usually bearing three macrochaetæ on the front side near the middle.
Two sternopleural macrochaetæ. Arista thickened on the basal fifth to one-fourth.	Three sternopleural macrochaetæ. Artista usually thickened on the basal half.

Described from 5 males and 4 females collected at Melrose Highlands, Massachusetts, August 1 to September 20, 1911, by the author and F. H. Mosher; 1 female from Lynn, Massachusetts, August 29, collected by F. W. Lowe; 1 female from New Haven, Connecticut, collected by W. E. Britton, August 14, 1906; and 1 female from Tampico, Mexico, taken by E. A. Schwarz.

Type: No. 14697, U. S. National Museum.

Phorcera incrassatus, new species.

Thorax and abdomen black, polished; scutellum brownish yellow on the apical two-thirds; legs brownish black, all thinly dusted gray pollinose; palpi yellow.

Length, 7 mm.

Head nearly one and one-half times as broad as long; front as wide as either eye; parafrontals, parafacials, and the cheeks yellowish-gray pollinose; frontal bristles descending to a point opposite the arista; outside of the frontal row a pair of proclinate orbital bristles and a number of black bristles and bristly hairs; frontalia opaque brown; antennæ black, dusted with whitish pollen, descending nearly to the oral margin, the third joint at least three and one-half times as long as the second; arista one and one-fourth times as long as the third antennal joint, thickened on the basal half, the penultimate joint only slightly longer than broad; vibrissæ on a level with the front edge of the oral margin; facial ridges ciliate on the lower half; sides of face each one-fifth as wide as the median depression; width of cheeks equal to about one-fifth the eye height; cheeks caudad of the vibrissæ, each bearing a row of strong bristles near the oral margin, the remainder bearing many black bristly hairs; palpi about as long as the proboscis.

Mesonotum black, polished, dusted yellowish-gray pollinose, distinctly vittate; four pairs of postsutural and three pairs of postacrostichal

bristles; pleuræ dusted grayish; three sternopleural bristles; scutellum pollinose, bearing three pairs of long marginal and a short apical pair of macrochaetæ; bristles and bristly hairs of scutellum erect; legs brownish black, thinly dusted grayish; front tarsi moderately dilated; middle tibiæ each bearing two macrochaetæ on the front side near the middle; hind tibiæ subciliate; calypteres tinged with yellow; wings hyaline, faintly tinged with yellow at the base and along the costa; the third vein bearing two or three bristles at its base; the small cross-vein distinctly before the middle of the discal cell; posterior cross-vein sinuous; bend of fourth vein not appendiculate; apical cell open.

Abdomen shining metallic black; dorsally, the first segment black; the remaining segments dusted yellowish-gray pollinose, the pollen appearing more dense on the sides and the basal margins of the segments; first segment bearing a pair of marginal macrochaetæ, the second two pairs of discals and one pair of marginals; the third two pairs of discals and a marginal row and the fourth segment bearing macrochaetæ on its apical two-thirds; hairs of abdomen depressed.

This species is very distinct from the other species of *Phorocera*; the general shape of the abdomen superficially resembles that of typical *Carcelia blanda* O. S.

Described from one female specimen taken at Moscow, Idaho.

Type: No. 14698, U. S. National Museum.

HYPERECTEINA Schiner.

The writer having experienced considerable difficulty in satisfactorily determining several specimens of this genus by the aid of Coquillett's "Revision of the Tachinidæ North of Mexico," and his later descriptions of members of this genus, recently had the good fortune to examine in the U. S. National Museum all of the representatives, including many of the types of this genus, described from America north of Mexico. As a result of this study it was possible to arrange what is hoped will serve as a satisfactory key to the described representatives of this genus in America north of Mexico.

Bezzi and Stein, in their "Katalog der Paläarktischen Dipteren," recognize the genus *Admontia*, described by Brauer and Bergenstamm in 1889 with *Degeeria amica* Meig. (as *podomyia*, new species) as the type of the genus. They have placed *Hyperecteina* Schiner in the synonymy. The genus *Hyperecteina* was described by Schiner in 1861; as it is not preoccupied, just how they arrived at this conclusion is somewhat of a mystery, as they include in the genus *Admontia* the species *metopina*, the type species of *Hyperecteina*, so designated by Schiner himself. In other words, they have entirely overlooked the fact that Schiner described the genus *Hyperecteina* with

metopina, a new species described by himself as the type some twenty-eight years before Brauer and Bergenstamm designated *Degeeria amica* Meigen as the type of their genus *Admontia*. *Degeeria amica* Meigen, therefore, becomes merely *Hyperecteina amica* Meigen. Mr. Coquillett has pointed out this fact in his paper, "The Type-species of the North American Genera of Diptera."

The representatives of the genus in America north of Mexico may be separated as follows:

1. The third abdominal segment in the female at most only normally carinate on the venter 2

   The third abdominal segment in the female abnormally carinate on the venter, the carina forming a wide lateral ridge and thickly beset with short black spines; front in the male two-thirds as wide as, in the female as wide as either eye; bristly hairs on the sides of the face not arranged in a single row; the third antennal joint in both sexes nearly twice as long as the second; arista thickened on the basal third, the penultimate joint broader than long; sides of face each nearly one-half as wide as the median depression; cheeks one-fourth as broad as the eye-height; facial ridges bristly on the lowest one-fourth to two-thirds; abdomen gray pruinose on the basal margins of the last three segments; bearing both discal and marginal macrochaetæ; three sternopleural macrochaetæ; the third vein bearing two or three bristles at its base. Length, 6 to 9 mm. 3 males and 5 females bred from *Hylotoma humeralis* Beauv. Type 4061, U. S. Nat. Mus. (Can. Ent. Vol. xxx, p. 233.) *hylotomæ* Coq.

2. Third vein bristly less than one-half the distance from base to the small cross-vein 3

   Third vein bristly at least two-thirds the distance from base to the small cross-vein; front in the female four-fifths as wide as either eye; parafrontals and the parafacials grayish white pollinose; sides of face each one-fifth as wide as the median depression; frontal bristles descending to the lower end of the eye; one bristle on the facial ridge above each vibrissa; first two joints of antennæ and the palpi yellow; arista thickened on the basal third; penultimate joint as broad as long; thorax thinly dusted grayish-white pollinose; scutellum bearing three pairs of long marginal macrochaetæ; three strenopleural macrochaetæ; middle tibiæ each bearing a single macrochaeta on the front side near the middle. One female from San Mateo County, California. Type, 7671 U. S. National Museum. (Invertebrata Pacifica, I, Feb. 10, 1904.) .... *setigera* Coq.

3. Palpi yellow 5
   Palpi black; three sternopleural macrochaetæ; bristly hairs or macrochaetæ on sides of face not arranged in a single row 4
4. Front in the male one and one-third times as wide as, in the female one and three-fourths to two times as wide as either eye; parafacials yellowish-gray pollinose; sides of face each one-third as wide as the median depression; usually three pairs of frontal bristles descending below base of the antennæ; the third antennal joint six to seven times as long as the second; arista thickened on basal three-fifths, penultimate joint at least twice as long as broad; facial ridges bristly on lowest two-thirds; thorax thinly dusted gray pollinose; scutellum bearing three pairs of long marginal macrochaetæ and a short apical pair; middle tibiæ each bearing a single macrochaeta on the front side near the middle; abdomen with thinly dusted grayish-white pruinose bands on the basal margins of the last three segments; first segment bearing a pair of marginal macrochaetæ; the others bearing both discal and marginal macrochaetæ; wings hyaline; third vein bearing two to four bristles at its base. Length, 5 to 8 mm. 4 females from Washington, D. C., and Beverly, Massachusetts. (Joun. N. Y. Ent. Soc., vol. III, p. 58; June, 1895.) . *pergandei* Coq.
   Front in the male four-fifths as wide as either eye; parafacials grayish-white pollinose; parafrontals shining black; cheeks nearly one-third as broad as the eye-height; third antennal joint three and one-half times as long as the second; arista slightly pubescent at the base, thickened on the basal two-fifths; penultimate joint longer than broad; thorax grayish-white pollinose; scutellum bearing three pairs of long marginal macrochaetæ; the middle tibiæ each bearing two macrochaetæ on the front side near the middle; the first abdominal segment black; the remaining segments with grayish-white pruinose bands on the basal margins; abdomen bearing both discal and marginal macrochaetæ; wings smoky tinged except along the hind margins; third vein bearing from one to three bristles at its base; apical cell closed in the margin of the wing, sometimes short petiolate. Length, 5 to 7 mm. 6 males from Moscow and Juliaetta, Idaho. Type: 6202 U. S. National Museum. (Proc. U. S. N. M., xxv, p. 105.) .... *limata* Coq.
5. With three sternopleural macrochaetæ 9
   With two sternopleural macrochaetæ, middle tibiæ each bearing a single macrochaeta on the front side near the middle; scutellum bearing a weak apical pair of macrochaetæ; abdominal segments except the first gray pruinose on the basal margins 6

6. Wings hyaline, or sometimes smoky costally 7
Wings subhyaline to small cross-vein, the remainder brown except the hind margin; front in the female one and one-fourth times as wide as either eye; parafrontals, parafacials, and the cheeks yellowish-gray pollinose; sides of face each one-third as wide as the median depression; bristly hairs on the sides of face not arranged in a single row; facial ridges bristly on the lowest two-fifths to three-fifths, third antennal joint in the female five to seven times as long as the second; arista thickened on the basal half, the penultimate joint twice as long as broad; thorax dusted yellowish-gray pollinose; the first abdominal segment bearing a pair of marginal macrochaetæ; the others bearing both discal and marginal macrochaetæ; hairs of abdomen long and depressed; the third vein bearing a single bristle at its base. Length, 7 mm. 2 females from Algonquin, Illinois, and National Park, New Jersey. Type: 3538, U. S. National Museum. (Journ. N. Y. Ent. Soc., vol. III, p. 55, June, 1895) . . . . *nasoni* Coq.
7. Abdomen bearing discal macrochaetæ; the third vein bearing more than one bristle at its base 8
Abdomen not bearing discal macrochaetæ; the third vein bearing a single bristle at its base; front in both sexes slightly wider than either eye; frontal bristles descending scarcely below base of second antennal joint; sides of face each one-fifth as wide as the median depression; facial ridges bristly on the lowest fourth; parafrontals and the parafacials grayish-white pollinose; the first two antennal joints yellow; the third joint three to four times as long as the second; thorax grayish-white pollinose; apical cell usually closed in the margin of the wing. Length 7 mm. One male and 5 females from Opelousas, Louisiana. Type, 4062 U. S. National Museum. (Can. Ent., vol. XXX, p. 234.) . . . . *unispinosa* Coq.
8. Antennæ black; front in the male as wide as, in the female one and one-fourth times as wide as either eye; parafrontals and the parafacials grayish white pollinose; cheeks nearly one-half as wide as the eye height; facial ridges bristly on the lowest one-third; the third antennal joint at least four times as long as the second; arista thickened on the basal two-fifths; penultimate joint usually twice as long as broad; orbital bristles present in both sexes; thorax gray pollinose. Length, 5 to 6 mm. 2 males and 2 females from District of Columbia and Beverly and Dorchester, Massachusetts. (Jour. N. Y. Ent. Soc., vol. III, p. 58, June, 1895. *Hypostena*) . . . . *degeerioides* Coq

Antennæ yellow, except at tip of the third antennal joint; front in the female as wide or slightly wider than either eye; one or two pairs of frontal bristles descending below the base of antennæ; sides of face each one-fifth as wide as the median depression; the facial ridges bristly on the lowest half; the third antennal joint five times as long as the second; arista thickened at least on the basal two-fifths; penultimate joint usually longer than broad; thorax dusted yellowish-gray pollinose; wings subhyaline, slightly smoky tinged costally; apical cell open, the third vein bearing two or three bristles at its base. Length, 6 to 9 mm. Four females from Opelousas, Louisiana, May, 1897, and Germantown, Pennsylvania. Type, 4063, U. S. National Museum. (Can. Ent., vol. XXX, p. 234.) .... *tarsalis* Coq.

9. Legs black; bristly hairs or macrochaetæ on the sides of the face arranged in a single row 10

Legs yellow; bristly hairs or macrochaetæ on the sides of the face not arranged in a single row; the tip of proboscis, the sides of the first two abdominal segments, and usually the apex of the abdomen yellow; front in the male one-third to one-half as wide as, in the female as wide as either eye; parafrontals, parafacials, and the cheeks yellowish-gray pollinose; three or four pairs of frontal bristles descending below the base of the antennæ; facial ridges bristly on the lowest third; third antennal joint in both sexes two to two and one-half times as long as the second; arista thickened on the basal two-fifths, the penultimate joint as broad as long; thorax gray pollinose; scutellum bearing three pairs of long marginal and a short apical pair of macrochaetæ; middle tibiæ each bearing a single macrochaeta on the front side near the middle; abdomen grayish pollinose; moderately carinate on the venter; bearing both discal and marginal macrochaetæ; wings hyaline; apical cell open; the third vein bearing two bristles at its base. Length, 8 to 10 mm. 3 males and 1 female from Washington, D. C. (List Dipt. Insects, part IV, p. 779, 1849, *Tachina*) .... *demylus* Walk.

10. Middle tibiæ each bearing a single macrochaeta on the front side near the middle; front in the male as wide as, in the female one and one-fifth times as wide as either eye; cheeks one-third as broad as the eye height; sides of face each one-fifth as wide as the median depression; facial ridges bristly on the lowest fourth; parafrontals and parafacials grayish-white pollinose; the third antennal joint four times as long as the second; arista thickened on the basal third, penultimate joint as broad as long; thorax gray

pollinose; scutellum bearing a short apical pair of macrochaetæ besides the long marginals; abdomen grayish pollinose; first segment bearing a pair of marginal macrochaetæ; the others bearing both marginal and discal macrochaetæ. 1 male and 1 female specimen bred from chrysalids of *Retinia* sp. Type, 3532, U. S. National Museum. (Revis. Tachin., p. 54.) . . . . *retinæ* Coq.

Middle tibiæ each bearing two macrochaetæ on the front side near the middle; front in both sexes about two-thirds as wide as either eye; cheeks one-half as broad as the eye height; facial ridges at most bearing one or two bristles above the vibrissæ; parafontals shining black, thinly dusted gray pollinose near the base of the antennæ; the third antennal joint in both sexes at least four times as long as the second; first two joints of the antennæ and the tip of the proboscis yellow; arista somewhat pubescent on the basal half, thickened on the basal fourth, penultimate joint longer than broad; orbital bristles present in both sexes; thorax gray pollinose; scutellum bearing three pairs of long marginal macrochaetæ; abdomen with grayish white pruinose bands on the basal margins of segments two and three; sometimes carinate on the venter; usually no discal macrochaetæ present; (2 females have a weak pair of discals on segments 2 and 3); wings slightly smoky tinged costally; third vein bearing two to four bristles at its base; apical cell closed or open in the margin of the wing. Length, 5 to 7 mm. 1 male and 5 females from Oswego, New York. Type, 4064, U. S. National Museum. (Can. Ent., vol. XXX, p. 234) . . *polita* Coq.

NOTES ON THYSANOPTERA.

By H. M. Russell,

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The writer presents these short notes at the present time as two of the species treated, *Heliothrips rubrocinctus* Giard and *Euthrips insularis* Franklin, have not been recorded from the United States, and the third, *Æolothrips bicolor* Hinds has heretofore only been recorded from Amherst, Massachusetts.

Heliothrips rubrocinctus Giard.

This species was observed by the writer to be seriously affecting the mango and avocado trees at Miami, Florida, during the months of January to May, 1909. It was found feeding in colonies on the foliage in all of its stages and mingling in with *Heliothrips hæmorrhoidalis* Bouché. In habits it was almost identical with the latter, but the younger stages were readily distinguished by a bright red band crossing the base of the abdomen, and the adult by its habit when disturbed of curling the abdomen entirely over the body and then moving away in that posture.

Euthrips insularis Franklin.

On January 5, 1909, Messrs. H. O. Marsh and D. K. McMillan collected this thrips in large numbers at Brownsville, Texas, in the blossoms of the velvet bean (*Dolichus atropurpureus*). Franklin described this species from the Barbados Islands, and Mr. David L. Crawford collected it at Guadalajara, Mexico, where, he stated, it was the commonest thrips present. On the velvet bean, this insect was causing considerable injury by feeding on the flowers. This was indicated by a brown spotting of the petals, many blossoms dropping off, so that there were few pods maturing.

Æolothrips bicolor Hinds.

While Mr. M. M. High was engaged in work on the onion thrips (*Thrips tabaci* Lind.), at Knox, Indiana, during August, 1911, he collected a number of specimens of this thrips. They were taken in company with *Æolothrips fasciatus* Fab. on the onion, where they were observed to be feeding on the onion thrips.

DESCRIPTIONS OF NEW NORTH AMERICAN THYSANOPTERA.

By J. Douglas Hood,
United States Biological Survey.

The classification of the order Thysanoptera is admittedly much in need of attention, and reliable synopses of genera and species are conspicuously wanting. A proposed treatise for the Genera Insectorum, now in preparation by Richard S. Bagnall, will do much to supply these long-felt wants; and in advance of its publication it seems desirable to make known a maximum number of so-called species, for the value of such a work of reference depends largely upon its exhaustiveness. In this paper I have thus attempted nothing more profound than the mere description of certain forms and groups of forms which appear after a morphological study to require new names for their proper designation.

Suborder TEREBRANTIA Haliday.

Family ÆOLOTHRIPIDÆ Haliday.

Æolothrips vittipennis, new species. (Pl. IV, figs. 1, 2.)

Female.—Length about 1.5 mm. Color dark blackish brown with a reddish cast, due to dense crimson hypodermal pigmentation in the thorax, abdomen, femora, tibiæ, and the two basal antennal segments; antennæ with segment 3 and basal half of segment 4 yellowish white.

Head about as wide as long, longer than prothorax, deeply and closely transversely striate, and with numerous minute spines on occiput and cheeks; anterior border deeply emarginate by the forward production of the eyes, and with a median tubercle; cheeks strongly arcuate. Eyes moderate, prolonged on ventral surface of head, and with the more dorsal facets separated by a distance about equal to their own diameter. Ocelli equidistant, the posterior nearly contiguous to eyes. Antennæ about 2.2 times as long as head, the last four segments subequal and together shorter than the preceding; sensory area on ventral surface of segment 5 elongate, the sense cone arising from basal end; segment 3 yellowish white, becoming dark blackish brown at extreme apex; 4 yellowish white in basal half or third, excepting for the dark pedicel; remainder of antenna blackish brown. Maxillary palpi three-segmented; labial palpi four-segmented.

Prothorax subrectangular, slightly shorter than head, and nearly one and one-half times as wide as long, widest near middle; surface with numerous minute spines. Mesothorax about 1.5 times as broad as prothorax, anterior angles broadly rounded; mesoscutum very closely transversely striate. Metathorax with sides roundly converging posteriorly; metascutum subreticulate. Wings of fore pair slender, about 8.5 times as long as width at middle, of nearly equal breadth throughout; venation normal; anal half occupied by a longitudinal black band which extends from the

extreme base, across the scale, and to the tip of the wing, sometimes showing a tendency to form a transverse band just beyond the basal third;[1] hind wings white or grayish. Legs normal to genus, the fore femora slender.

Abdomen slender, normal to the genus.

Male.—Length about 1.1 mm. Fore wings with a transverse black band just beyond the basal third, in addition to the longitudinal band on posterior half. Abdomen very slender; ninth segment nearly as long as wide, narrowed toward apex, and without clasping organs.

Measurements of holotype: Length 1.48 mm.; head, length 0.180 mm., width 0.197 mm.; prothorax, length 0.148 mm., width 0.218 mm.; mesothorax, width 0.320 mm; abdomen, width 0.342 mm. Antennal segments: 1, 36 μ; 2, 50 μ; 3, 114 μ; 4, 87 μ; 5, 58 μ; 6, 12 μ; 7, 13 μ; 8, 13 μ; 9, 11 μ; total length of antenna, 0.39 mm.; width at segment 4, 0.026 mm.

Described from 10 females and 8 males, taken on honey locust (*Gleditsia triacanthos* L.), at Topeka, Illinois, May 23, 1909, and August 7, 1908, by Mr. Charles A. Hart, and one living female from Washington, D. C., July 28, 1912, J. D. H., on yellow locust (*Robinia pseudacacia* L.).

Type locality: Topeka, Illinois.

In the coloration of the wings, this species resembles *Æ. vittatus* Haliday and *Æ. kuwanaii* (sic !) Moulton, which occur, respectively, in Europe and the Pacific coast region of North America. From both it may be known by the longer head, shorter prothorax, and the details of wing coloration. In addition to these characters, it is also to be noted that in *kuwanaii* only the third antennal segment is white, the spine-bearing sense area on the ventral surface of the fifth antennal segment is circular in form, the head is not emarginate in front, and, most important of all, the ninth abdominal segment of the male is provided with lateral claspers.

Æolothrips crassus, new species. (Pl. IV, figs. 5, 6.)

Female.—Length about 1.5 mm. Color dark blackish brown, with a reddish cast, due to crimson hypodermal pigmentation in the thorax, abdomen, and femora; antennæ with segments 3 and 4 pale yellowish white, the latter blackish at extreme apex.

Head about 1.3 times as wide as long, about as long as prothorax, not transversely striate, and with minute spines on occiput and cheeks; anterior border not deeply emarginate by a forward prolongation of the eyes, and without median tubercle; cheeks slightly swollen. Eyes moderate in size, prolonged as usual on ventral surface of head, and with the more dorsal facets separated by a distance much less than their own diameters. Ocelli equidistant. Antennæ nearly 2.5 times as long as head, unusually stout; segment 3 about equal to 1+2 and only about three times as long as

[1] This band always finds its complete development in the male.

wide; 4 subequal to 3; 5–9 together nearly 1.3 times as long as 3, the last four segments subequal and together about equal to the one preceding; sensory area on ventral surface of segment 5 circular. Maxillary palpi three-segmented; labial palpi four-segmented.

Prothorax about two-thirds as long as greatest width, distinctly broadened behind. Mesothorax a little less than 1.4 times as broad as prothorax, anterior angles broadly rounded; mesoscutum very closely transversely striate. Metathorax with sides roundly converging posteriorly; metascutum subreticulate. Wings of fore pair moderately slender (about seven times as long as width at middle), slightly narrower in basal third; venation normal, or with the lower subapical cross-vein wanting; anal half of wing traversed by a longitudinal black band which extends from the basal fifth to the tip of the wing, becoming paler and narrower at apex, and, in the second fifth, broadened to nearly the costal margin; hind wings grayish. Legs short and stout, the fore femora only about one and one-half times as long as wide.

Abdomen stout, of normal structure.

Measurements of holotype: Length 1.55 mm.; head, length 0.162 mm., width 0.209 mm.; prothorax, length 0.168 mm., width 0.264 mm.; mesothorax, width 0.360 mm.; abdomen, width 0.432 mm. Antennal segments: 1, 36 μ; 2, 54 μ; 3, 92 μ; 4, 90 μ; 5, 57 μ; 6, 14 μ; 7, 14 μ; 8, 14 μ; 9, 14 μ; total length of antenna, 0.39 mm., width at segment 4, 0.030 mm.

Described from one female, taken on Plummer's Island, Maryland (in the Potomac River near Washington, D. C.), May 19, by W. L. McAtee and the writer. It was found in a flower of *Hydrophyllum virginicum* L.

This species, like the preceding, is related to *kuwanaii* and *vittatus*. From the former it may be known by the white fourth antennal segment and the stouter facies; from the latter its separation is more difficult, judging from the brief published descriptions, but should be distinct by the longer segments 5–9, which together are fully a fifth longer than segment 3, instead of subequal to it as in *vittatus*. The latter is known only from England, Finland, Sweden, and Austria-Hungary (Dalmatia).

With the specimen above described, I have doubtfully associated another female, taken on a conifer at Urbana, Illinois, May 21, 1908, by J. V. Bopp, then a student in the University of Illinois. It agrees with the type in most respects, but the third antennal segment is slenderer and darkened at tip, the basal transverse band on the wing is complete, and a second band shows a tendency to appear near the apex of the wing, just basal to the apical seventh.

FAMILY THRIPIDÆ HALIDAY.

Genus MEROTHRIPS nov.

(μηρὸς, the femur; θρίψ, a wood worm.)

Head rather elongate, anteriorly obtusely angulate, with a pair of long bristles on dorsum between eyes and antennæ. Eyes (in the type species) greatly reduced; ocelli wanting. Antennæ long, approximate, eight-segmented, moniliform, inserted on ventral surface of head; segments 3 and 4 with sense areas (instead of sense cones) at apex; segment 8 elongate, fusiform. Mouth cone equal in length to face, semicircularly rounded at apex; maxillary palpi three-segmented; labial palpi two-segmented. Prothorax trapezoidal, broader than long and somewhat longer than head, with a pair of subparallel longitudinal sutures separating the notum from pleuron and coxa; posterior angles with a single long bristle. Legs very stout; metacoxæ separated by less than their own diameters; mesocoxæ separated by an interval thrice as great; fore and hind femora greatly enlarged; male with a broad subbasal tooth on inner margin of fore femur and with a long, stout tooth on inner margin of fore tibia at tip. Abdomen moderately slender, exceedingly blunt at tip, the apical segments very transverse and with long, weak spines; ovipositor greatly reduced, certainly functionless; abdomen of male without ventral sensory areas and without strong, chitinous projections on apical segments.

Type: Merothrips morgani, new species.

In the weakened, pale cuticula, reduced organs of vision, enlarged femora, and functionless ovipositor, the whole insect shows a remarkable adaptation to life under bark and in other similarly secluded places—a habit until now wholly unknown among the Thripidæ. The affinities of such an anomalous genus may be thought open to speculation, but, in our present arrangement of the genera of this family, it seems to take a natural position just after *Chirothrips*. The ancestors of this form were almost certainly *Chirothrips*-like Thripidæ which, originally passing only the winter under bark, became gradually adapted to that method of life as a fixed habit, through finding there suitable food and adequate protection, both from enemies and unfavorable climatic conditions. The loss of the ovipositor is easily explained, for, as in the Tubulifera, there is no need to hide the eggs in plant parenchyma to avoid their being injured, because under bark may be found safe hiding places in plenty.

Merothrips morgani, new species. (Pl. V, figs. 1–3.)

Female.—Length about 0.8 mm. Color pale grayish yellow, gray, or brown, with head, legs (especially the anterior pair), and first two antennal segments suffused with yellow.

Head smooth, about 1.25 times as long as wide, broadest at basal third, cheeks evenly arcuate to eyes and base of head; vertex flattened, angulate in front, the sides forming an angle of 125°, and with a pair of prominent, post-antennal bristles equal in length to segments 1+2 of antennæ; frontal costa notched at 90°; two pairs of bristles behind eyes, the inner pair shorter and subequal to, or rather longer than, a third pair between eyes. Eyes rudimentary, only about three facets visible in lateral profile. Ocelli and ocellar pigment entirely wanting. Antennæ long and slender, about 2.7 times as long as head; base of segment 1 hidden by vertex; form and structure well shown in figure (Pl. V, fig. 1).

Prothorax trapezoidal, about 1.2 times as long as head and (inclusive of coxæ) about 1.4 times as broad as long and 1.8 times as broad at base as at apex, with faint anastomosing lines of sculpture; notum not attaining lateral margins, separated from the pleural plate and the coxa by a longitudinal, sinuate suture extending from the anterior angle to the base; mediad to this suture often a longitudinal carina attaining about middle of prothorax; several short bristles present in addition to the long pair at the posterior angles (Pl. V, fig. 2). Pterothorax reduced, subequal in width to prothorax; mesonotum with a pair of prominent bristles on each side near anterior angles; mesosternum with two prominent bristles at extreme lateral margin, metasternum with one. Legs exceedingly stout, fore and hind femora greatly enlarged, the former nearly as wide as head, and the latter two-thirds as wide as long. Wings lacking.

Abdomen about 2.66 times as long as wide, broadest at about segment 6, weak and very blunt at apex; terminal bristles long, slender, and transparent, a lateral pair on segment 9 about five-sixths as long as greatest width of abdomen.

Measurements of holotype: Length 0.823 mm.; head, length 0.089 mm., width 0.071 mm.; prothorax, length 0.105 mm., width 0.147 mm.; pterothorax, width 0.144 mm.; abdomen, width 0.176 mm. Antennal segments: 1, 23 μ; 2, 27 μ; 3, 38 μ; 4, 35 μ; 5, 26 μ; 6, 28 μ; 7, 26 μ; 8, 36 μ; total length of antenna, 0.24 mm.; width at segment 4, 0.016 mm.

Male.—Length about 0.75 mm. Last two abdominal segments distinctly yellowish. General structure as in female. Fore femur toothed on inner margin near base; inner side of fore tibia produced at apex in a stout, acute tooth. Dorsum of head apparently minutely granulate, certain of these granules darker and arranged in anastomosing lines. Apex of abdomen suggestive of that of *Chirothrips*, all bristles slender. Accessory sexual organs heavily chitinized; testes not visible.

Described from 3 females and 1 male, as follows: Homer, Illinois, October 3, 1908, under loose bark on shellbark hickory tree, J. D. H., 1 female; Olney, Illinois, November 19, 1908, from branch of post oak (*Quercus stellata* Wang.), L. M. Smith, 1 female; Illinois, July, 1909, in burrows of freshly-hatched larvæ of *Oncideres cingulata* Say in dead hickory twig,

probably from the southern part of the State, J. D. H., 1 male; "Corbin, Ky., Sept. 26, 1911, in mushroom, A. C. Morgan, collector," 1 female (coll. A. C. Morgan).

Type locality: Homer, Illinois.

The name is proposed as a compliment to Mr. Morgan, who had recognized the form as generically and specifically distinct and had drawn up a description, previous to learning that my manuscript on the same species was ready for the press.

Frankliniella stylosa, new species. (Pl. V, fig. 7.)

Female.—Length about 1.3 mm. General color dark; abdomen blackish brown, slightly paler at base; ptero- and pro-thorax bright cinnamon-brown, the former with sides and notum tinged with gray, the latter distinctly darker with blackish; head yellowish gray, darkened with blackish at base, and (by reflected light) with vertex and inner and posterior margins of eyes almost white; antennæ grayish brown, segment 2 darkest, bases of 3, 4, and 5 pale; fore wings washed with blackish, slightly paler in basal fourth; legs yellowish gray, all femora darker and shaded on outer surface with brown.

Head fully 1.5 times as wide as long, conspicuously narrowed posteriorly, the breadth of its hind margin about 0.9 the greatest width of the head; occiput with a few transverse lines; interocellar and one pair of post-ocular bristles alone prominent, stout, black, the former longer; other bristles slender, pale, inconspicuous. Eyes moderate in size, normal to the genus, about three-fifths as wide as their interval. Ocelli present, posterior pair nearly opposite middle of eyes. Antennæ moderately stout, three times as long as dorsum of head, all spines long, stout, prominent; form of segments normal to genus (Pl. V, fig. 7); segment 3 subequal to or longer than 6; 8 about 1.75 times as long as 7; segment 1 gray; 2 usually decidedly darker (amost black as seen by aid of hand lens), gray-brown in color; 3 and 5 gray, paler in basal half, the latter with pedicel dark at extreme base; 4 slightly darker, less pale in basal half; 6–8 uniform gray.

Prothorax about 1.4 times as wide as long and 1.4 times as long as head, the two prominent bristles at each angle all equal in length, nearly black in color, about three-fifths as long as prothorax; posterior margin with the pair of bristles near middle similar in form and color, and two-thirds as long. Pterothorax normal to genus; a pair of dark bristles on anterior margin of metascutum nearly equal to that plate in length, the pair external to these short, slender, colorless. Legs of medium length and moderate size. Wings of fore pair only slightly paler at base; anterior margin with about 25 bristles, anterior vein with about 19, and posterior vein with about 15.

Abdomen of normal form; all bristles stout and dark in color; posterior margin of segment 8 with a series of about 15 equidistant spine-like projections on dorsum; tenth segment with longitudinal dorsal suture.

Measurements of holotype: Length 1.26 mm.; head, length 0.102 mm., width 0.167 mm.; prothorax, length 0.143 mm., width 0.208 mm.; mesothorax, width 0.288 mm.; abdomen, width 0.300 mm. Antennal segments: 1, 30 μ; 2, 44 μ; 3, 58 μ; 4, 48 μ; 5, 40 μ; 6, 56 μ; 7, 9 μ; 8, 16 μ; total length of antenna, 0.30 mm.; width at segment 4, 0.023 mm.

Described from 8 females, taken in flowers of *Viburnum acerifolium* L. and *Chionanthus virginica* L., on Plummer's Island, Maryland (in the Potomac River near Washington, D. C.), May 19, 1912, by W. L. McAtee and the writer.

This pretty species seems to be more closely allied to the African *F. schultzei* (Trybom) than to any other, resembling it in that the head is narrowed behind and the eighth antennal segment conspicuously longer than the seventh. The coloration of the body and antennæ, however, will readily distinguish the two. In North America it finds its closest relative in *F. insularis* (Franklin), but the antennal structure, as well as the coloration of body, legs, wings, and antennæ, is decidedly different in that species.

Heliothrips punctipennis, new species.

Female.—Length about 0.97 mm. General color dark blackish brown to nearly black, with head and thorax distinctly paler and of a brownish yellow color, abdomen with last three segments pale; legs clear lemon yellow; antennæ grayish white, 1, 2, and 6–8 darker.

Head about 1.2 times as wide as long and slightly longer than prothorax; cheeks slightly arcuate; dorsal surface rather conspicuously reticulate, roughened between the lines of reticulation; frontal costa distinctly narrower than first antennal segment; vertex subcarinate in front of ocelli. Eyes about 1.5 times as long as their distance from posterior margin of head, scarcely protruding, setose. Ocelli of normal form and position. Antennæ twice as long as head; segment 1 subquadrate; 2 broadest in entire antenna, a little longer than wide; 3 and 4 urn-shaped, the former little less than twice as long as wide; 5 egg-shaped, pedicellate; 6 and 7 together of same form as 5, but inverted; 8 very long and slender. Segments 1, 2, and 6–8, brown, the first paler; intermediate segments nearly clear white, slightly clouded with brownish toward apex. Maxillary palpi two-segmented.

Prothorax about 1.7 times as wide as long, slightly shorter than head, and with similar reticulation; bristles few, short and well distributed, a more prominent pair near middle of anterior margin. Pterothorax somewhat broader than prothorax; membrane yellow, plates brown. Wings long, very slender, overreaching the abdomen; fore wings about eighteen times as long as width at middle, of normal venation; costal margin with about 19 bristles; principal vein with four colorless bristles, of which two are near base and two near fork; anterior vein with one bristle near base and two

near apex, all short, slender, the last brownish; posterior vein with five or six usually equidistant bristles, all slender and colorless; fore wings nearly white, with apex dark brown and with a light cloud of brown at the fork of the veins; hind wings brownish, with darker median vein.

Abdomen slender, ovate, pointed at tip; notum subreticulate, more faintly at middle; segment 10 with longitudinal dorsal suture.

Measurements of holotype: Length 0.972 mm.; head, length 0.114 mm., width 0.142 mm.; prothorax, length 0.102 mm., width 0.178 mm.; mesothorax, width 0.216 mm.; metathorax, width 0.197 mm.; abdomen, width 0.246 mm. Antennal segments: 1, 18 μ; 2, 36 μ; 3, 41 μ; 4, 34 μ; 5, 30 μ; 6, 24 μ; 7, 12 μ; 8, 29 μ; total length of antenna, 0.22 mm., width at segment 4, 0.021 mm.

Described from 5 females, 2 of which were taken in sweepings at Matamoros, Mexico, June 30, 1908, and 3 from Brownsville, Texas, December 8, 1910, in sweepings from Bermuda grass (*Cynodon dactylon* (L.) Pers.). All were collected by Mr. Hart.

Type locality: Matamoros, Mexico.

The small size of this species and the peculiar coloration of the legs and wings should make it easy of recognition. It belongs in the vicinity of *fasciatus*, *fasciapennis*, and *phaseoli*.

Heliothrips marginipennis, new species.

Female.—Length about 1.1 mm. Color dark blackish brown to nearly black, very slightly, if any, paler anteriorly; legs brown, the femora and tibiæ yellow at extremities; tarsi yellow; antennal segments 1, 2, and 6-8 nearly concolorous with body, intermediate segments brownish yellow and more or less clouded with brown.

Head about 1.2 times as wide as long, equal in length to prothorax; cheeks nearly straight and parallel; dorsal surface conspicuously reticulate, more particularly so behind an irregular transverse line at basal fourth; frontal costa distinctly narrower than first antennal segment. Eyes very slightly longer than their distance from posterior margin of head, slightly prominent, setose. Ocelli of normal form and postion. Antennæ twice as long as head; segment 1 subquadrate; 2 broadest in entire antenna, a little longer than wide; 3 and 4 urn-shaped, the former slightly more than twice as long as wide; 5 almost perfectly egg-shaped, pedicellate; 6 and 7 together of same form as 5, but inverted; 8 very long and slender. Segments 1, 2, and 6-8 blackish brown, the first paler; intermediate segments pale brownish yellow, 3 and 4 darkly clouded with brown just beyond middle, 5 dark brown in apical two-thirds. Maxillary palpi two-segmented.

Prothorax about 1.7 times as wide as long, equal in length to head and with similar reticulation; bristles few, short, well distributed, a more prominent pair near middle of anterior margin. Pterothorax somewhat broader than prothorax; membrane yellowish, plates brown. Wings long, very slen-

der, overreaching the abdomen; fore wings about eighteen times as long as width at middle, of normal venation; costal margin with about 20 bristles; principal vein with four colorless bristles, of which two are near base and two near fork; anterior vein with one bristle near base and two near apex, all slender, the last brownish; posterior vein with six or seven usually equidistant bristles, all long and slender, colorless; fore wings nearly white, with a short, dark band at fork of veins connected with one at apex by a narrow line of brown extending along the extreme posterior margin and hooked foward in apical twelfth (where it is darkest) along anterior margin; hind wings brownish, with darker median vein.

Abdomen moderately slender, ovate, pointed at tip; notum subreticulate, more faintly at middle; segment 10 with longitudinal dorsal suture.

Measurements of holotype: Length 1.08 mm.; head, length 0.126 mm., width 0.156 mm.; prothorax, length 0.120 mm., width 0.206 mm.; mesothorax, width 0.259 mm.; metathorax, width 0.240 mm.; abdomen, width 0.300 mm. Antennal segments: 1, 18 μ; 2, 39 μ; 3, 48 μ; 4, 44 μ; 5, 34 μ; 6, 27 μ; 7, 18 μ; 8, 33 μ; total length of antenna, 0.26 mm.; width at segment 4, 0.023 mm.

Described from three females taken by Mr. Hart in sweepings, at Monterey, Mexico, July 5, 1908.

This species, also, is related to the group of which *fasciatus* is typical. The wing coloration is distinctive.

Heliothrips cinctipennis, new species.

Female.—Length about 1.2 mm. General color yellowish brown to nearly black, with head and thorax much paler than abdomen, the latter with last three segments distinctly paler; legs yellow, with the fore femora at base, and the middle and posterior femora and all tibiæ, at middle, shaded with brownish; antennæ pale, segments 1, 2, and 6–8, nearly concolorous with body, intermediate segments nearly white, slightly clouded with brown toward apex.

Head about 1.2 times as wide as long, distinctly longer than prothorax; cheeks subparallel, arcuate; dorsal surface conspicuously reticulate, more coarsely toward base; frontal costa nearly as wide as first antennal segment. Eyes distinctly longer than their distance from posterior margin of head, slightly prominent, setose. Ocelli of normal form and position. Antennæ usually a little less than twice as long as head; segment 1 subquadrate; 2 broadest in entire antenna, a little longer than wide; 3 and 4 urn-shaped, the former slightly more than twice as long as wide; 5 egg-shaped, pedicellate; 6 and 7 together of same form as 5, but inverted; 8 very long and slender; segments 1, 2, and 6–8, brown, the first paler; intermediate segments pale brownish yellow, slightly clouded with gray in apical portion. Maxillary palpi two-segmented.

Prothorax about 1.9 times as wide as long, distinctly shorter than head and with similar reticulation; bristles few, short, well distributed, a more prominent pair near middle of anterior margin. Pterothorax somewhat

broader than prothorax; membrane yellowish, plates brown. Wings long, very slender, overreaching abdomen; fore wings about eighteen times as long as width at middle, of normal venation; costal margin with about 18 bristles; principal vein with four short colorless bristles, of which two are near base and two near fork; anterior vein with one bristle at base and two near apex, all slender, the last longer and brownish; posterior vein with four or five nearly equidistant bristles, these usually rather short, colorless; fore wings white, with a dark brown or black band occupying the second and third fourths, margined with darker brown in apical eighth, extreme base lightly washed with brown; hind wings brownish, with darker median vein.

Abdomen moderately slender, ovate, pointed at tip; notum subreticulate, more faintly at middle; segment 10 with longitudinal dorsal suture.

Measurements of holotype: Length 1.16 mm.; head, length 0.133 mm., width 0.161 mm.; prothorax, length 0.109 mm., width 0.212 mm.; mesothorax, width 0.248 mm.; metathorax, width 0.224 mm.; abdomen, width 0.300 mm. Antennal segments: 1, 18 μ; 2, 37 μ; 3, 45 μ; 4, 40 μ; 5, 38 μ; 6, 33 μ; 7, 14 μ; 8, 33 μ; total length of antenna, 0.26 mm., width at segment 4, 0.021 mm.

Male.—Length about 0.8 mm. Sternum of abdominal segments 3-7 each with a nearly circular pale area. Segment 9 with two pairs of dorsal spines, the basal pair much shorter and stouter than the apical.

Described from 25 females and 4 males, from Anna, Clay City, Grand Tower, Havana, Hillery, and Makanda, Illinois, all taken by Mr. Hart in sweepings from grass and weeds, during June, July, August, and September.

In the specimens at hand the coloration of the body, wings, and antennæ is remarkably constant, and serves to distinguish the species from the allied *H. fasciapennis* (sic!) Hinds. In the latter species, furthermore, the pale areas on the ventral surface of the male abdomen are fully five times as wide as long, instead of transversely oval or nearly circular.

Thrips pallicornis, new species. (Pl. v, figs. 5, 6.)

Female.—Length about 1.2 mm. Color dark blackish brown or black, with bright crimson hypodermal pigmentation, more brilliant in pterothorax and second antennal segment; segments 3-7 pale lemon-yellow, slightly shaded with gray; wings of fore pair white in basal fourth, remainder blackish brown.

Head 1.4 times as wide as median dorsal length, somewhat longer than prothorax, as broad across eyes as midway between eyes and base; cheeks arcuate to eyes and base of head; vertex rather depressed, frontal costa notched at about 60°; four pairs of very distinct bristles behind eyes, and another similar pair between anterior and posterior ocelli; a small pair lateral to and in front of the anterior ocellus. Eyes rather less than half

as long as head, prominent, protruding, noticeably pilose. Ocelli normal, opposite about middle of eyes. Antennæ long, more than twice the length of head, unusually slender, form and structure well shown in figure (Pl. v, fig. 6); segments 1 and 2 concolorous with head, the latter segment, however, with dense crimson pigment; remainder of antenna yellow, with base of third and, to a less degree, of fourth to sixth and all of seventh, usually shaded with gray. Maxillary palpi three-segmented.

Prothorax about 1.5 times as wide as long, without evident sculpture, sides gently rounded; two pairs of long, slender bristles at posterior angles. Wings of fore pair about fourteen times as long as wide, white in basal fourth, remainder blackish brown; costal margin with about 25 spines; anterior vein with 10 spines, of which seven are nearly confined to the white band (not passing basal 4/11 of wing), the remaining three at 7/11, 9/11, and a little more than 10/11 beyond base of wing, respectively; posterior vein also with about 10 spines, the first of which is usually exactly behind the last spine in the basal series of the anterior vein, and the last of which is opposite a point nearly midway between the last two on the anterior vein. Legs concolorous with body, rather conspicuously set with stout, dark bristles.

Abdomen of normal form, with tenth segment longitudinally sulcate above in at least apical half; bristles on segments 9 and 10 long, stout, nearly black.

Measurements of holotype: Length 1.24 mm.; head, length 0.144 mm., width 0.163 mm.; prothorax, length 0.132 mm., width 0.193 mm.; mesothorax, width 0.276 mm.; metathorax, width 0.246 mm.; abdomen, width 0.282 mm. Antennal segments: 1, 30 μ; 2, 42 μ; 3, 64 μ; 4, 54 μ; 5, 48 μ; 6, 58 μ; 7, 22 μ; total length of antenna, 0.32 mm., width at segment 4, 0.019 mm.

Male.—Length about 1 mm. Similar in color and general structure to female. Segment 9 above with a pair of short, slender bristles at apical third near lateral margin, and with four larger bristles—apical, equidistant, and subparallel—lying closely above suranal plate; the latter with four slender bristles at apical third, the median pair longer; lateral, subapical bristles of segments 9 and 10 long, dark, moderately conspicuous.

Measurements of allotype: Length 0.98 mm.; head, length 0.127 mm., width 0.144 mm.; prothorax, length 0.102 mm., width 0.167 mm.; mesothorax, width 0.223 mm.; metathorax, width 0.192 mm.; abdomen, width 0.164 mm. Antennal segments: 1, 29 μ; 2, 38 μ; 3, 60 μ; 4, 51 μ; 5, 41 μ; 6, 58 μ; 7, 20 μ; total length of antenna, 0.30 mm., width at segment 4, 0.018 mm.

Described from 17 females and 4 males, all from Illinois, as follows: Carbondale, September 19, 1908, L. M. Smith, 1 male; Clay City, September 2, 1909, C. A. Hart, 2 females; Dubois, April 28 and September 17, 1908, July 3, 1909, C. A. H., L. M. S., 12 females, 3 males; Herrin, May 12, 1909, L. M. S., 1 female; Olney, May 4, 1909, L. M. S., 1 female;

Parker, July 14, 1909, C. A. H., 1 female. All specimens, with the exception of the single female from Olney, which was taken on an apple leaf, were found on the under surface of hickory leaves, sometimes in abundance.

Type locality; Parker, Illinois.

The antennal coloration is distinctive. Superficially the species bears a close resemblance to *Baliothrips basalis* Shull.

Suborder TUBULIFERA Haliday.

Family PHLŒOTHRIPIDÆ Uzel.

Zygothrips pallidus, new species. (Pl. VI, figs. 1, 2.)

Female (forma brachyptera).—Length about 1.6 mm. Color clear, bright lemon-yellow, with antennal segments 7 and 8 shaded with brown, and apical three-fourths of tube abruptly nearly black. (By reflected light the legs and antennæ appear darker, due to the absence therefrom of the yellow hypodermal pigment, which is very dense in the other regions of the body.)

Head about 1.4 times as long as wide, very slightly broadest at basal fourth, thence evenly narrowing to eyes and base; vertex elevated, almost overhanging, evenly declivous; dorsal and lateral surfaces without sculpture, the spines few and very inconspicuous; postocular bristles short, two-thirds as long as eyes, blunt but not capitate. Eyes about one-third as long as head, slightly protruding, nearly prominent. Anterior ocellus scarcely overhanging, the posterior pair opposite anterior third of eyes. Antennæ slightly more than one and one-half times as long as head, rather stout; segment 1 nearly as broad at base as long; 2 stout, globose; 3 much narrower than 2, stout, swollen just beyond the abrupt pedicel; 4 clavate, longest in entire antenna, nearly as stout as 2; 5–7 clavate, sucessively decreasing in length and breath; 8 conical, twice as long as wide, more than two-thirds as wide at base as apex of 7; sense cones short, weak, transparent, barely visible. Mouth cone blunt, much shorter than width of head, reaching about to middle of prosternum; labrum not attaining labium.

Prothorax about as long as width of head and (inclusive of coxæ) about one and two-thirds times as wide as long; surface smooth; anterior marginal and midlateral bristles wanting, others short and blunt (scarcely capitate), the two pairs near the posterior angles subequal in length and longest; coxal bristle similar to and nearly as long as the latter. Pterothorax slightly wider than prothorax, sides nearly straight and parallel. Legs rather stout, of moderate length; fore tarsi armed with a very small, acute tooth; color lemon-yellow, without shading even on femora.

Abdomen (greatly distended in the type) of apparently normal form. Tube about half as long as head, less than twice as long as basal width, and about half as wide at apex as at base; terminal bristles brown, very slightly longer than tube; all other abdominal bristles clear yellow.

Measurements of holotype: Length 1.56 mm.; head, length 0.252 mm., width 0.180 mm.; prothorax, length 0.180 mm., width (inclusive of coxæ) 0.300 mm.; pterothorax, width 0.312 mm,; abdomen, width 0.360 mm.; tube, length 0.120 mm., width at base 0.073 mm., at apex 0.038 mm. Antennal segments: 1, 44 μ by 41 μ; 2, 53 μ by 35 μ; 3, 51 μ by 31 μ; 4, 62 μ by 35 μ; 5, 57 μ by 30 μ; 6, 53 μ by 27 μ; 7, 48 μ by 24 μ; 8, 27 μ by 13 μ; total length of antenna, 0.39 mm.

Male.— Much smaller than female; length about 1 mm. Color luteous, shaded with gray on femora, tibiæ, segments 4–8 of antennæ, and apical three-fourths of tube. Ocelli apparently wanting. Prothoracic bristles rather more capitate than blunt. Abdomen slender. Otherwise similar to female.

Described from 1 female (holotype) from Brownsville, Texas, taken December 8, 1910, in sweepings from Bermuda grass; and 1 male (allotype) from Padre Island, Texas (opposite Point Isabel), taken June 28, 1908, "in sweepings from grass, etc." Both specimens were taken by Mr. Hart.

The coloration of this species is remarkable, as is also the structure of the third antennal segment.

It will be noticed that the two illustrations given herewith are unfortunately of the male, for the reason that the female was not known until two years after the execution of the drawings.

Genus RHYNCHOTHRIPS nov.

(*ῥύγχος*, beak; *θριψ*, a wood worm.)

Head little, if any, longer than broad, about equal in length to prothorax; cheeks finely roughened, without spiniferous tubercles. Antennæ eight-segmented, the last two segments closely united. Eyes one-third or one-fourth as long as head. Ocelli placed far forward, the median one overhanging, sometimes borne at tip of slightly produced vertex. Mouth cone unusually long and slender, fully as long as dorsum of head, attaining or surpassing front margin of mesosternum; labrum very acute, elongate, sometimes one and one-third times as long as width of head. Prothorax large, heavy, nearly or quite as long as head, with median dorsal thickening; anterior and posterior margins concentric. Fore tarsi usually unarmed. Wings, when present, of nearly equal width throughout. Abdomen broad and heavy, with short bristles.

Type: Rhynchothrips pruni, new species.

This genus will also embrace *Trichothrips tridentatus* Shull and *T. buffæ* Hood. The very long mouth cone and the large, heavy prothorax are distinctive. Though two of its species were described in *Trichothrips*, it appears to be much more closely related to *Liothrips*. All the known species occur under

the loose scales of bark on living trees, and the peculiar mouthparts appear to be an adaptation to such a life.

Rhynchothrips pruni, new species. (Pl. VI, fig. 4.)

Female (forma brachyptera).—Length about 1.5 mm. Color nearly black, thorax paler; tarsi, articulations of legs, and at least the basal portions of antennal segments 1–6, ochreous.

Head as wide as long, broadest somewhat behind eyes; cheeks slightly converging posteriorly, rounded rather abruptly to eyes and gently to base of head; lateral and dorsal surfaces noticeably transversely striate, sparsely, briefly, and scarcely visibly spinose; vertex slightly rounded in front; postocular bristles pointed, equal in length to eyes. Eyes one-fourth as long as head, subcircular as seen from above. Ocelli small, situated far forward; anterior ocellus well down on vertex, overhanging; posterior ocelli situated near anterior angles of eyes. Antennæ stout, slightly more than twice as long as head, faintly subreticulate; segment 1 slightly broader than long; 2 swollen, 1.5 times as long as wide; 3 swollen, clavate, scarcely twice as long as wide, pedicel one-fourth of greatest width; 4–6 subglobose, pedicellate, less than 1.5 times as long as wide, 4 broadest, 6 with sides less rounded apically; 7 oblong, pedicellate, truncate at apex and broadly united to 8, which is conical, not narrowed at base, and twice as long as wide; antennæ bright ochre in first two segments, becoming gradually darker toward apex, 7 and 8 being concolorous with body. Sense cones of moderate length, slender; formula: 3, 0–1; 4, 1–1; 5, $1\text{–}1^{+1}$; 6, $1\text{–}1^{+1}$; 7 with one on dorsum near apex. Mouth cone very long, slender, fully as long as dorsum of head, surpassing base of prosternum; labrum surpassing labium.

Prothorax slightly longer than head and (inclusive of coxæ) only 1.7 times as wide as long; pronotum with short, median thickening; all spines present, pointed, only the pair at posterior angles long. Pterothorax slightly wider than prothorax, sides straight, slightly diverging posteriorly. Legs short and stout, the fore femora shorter than head; fore tarsi unarmed.

Abdomen large, broad, about 1.4 times as wide as prothorax, narrowing roundly from about segment 4 to base of tube. Tube about 0.9 as long as head, less than twice as long as basal width, and fully twice as wide at base as at apex, sides straight. Bristles pointed, brown; lateral bristles on segment 9 subequal to terminal bristles, equal in length to tube.

Measurements of holotype: Length 1.55 mm.; head, length 0.162 mm., width 0.163 mm.; prothorax, length 0.175 mm., width (inclusive of coxæ) 0.296 mm.; pterothorax, width 0.318 mm.; abdomen, width 0.426 mm.; tube, length 0.148 mm., width at base 0.081 mm., at apex 0.035 mm. Antennal segments: 1, 27 μ; 2, 50 μ; 3, 54 μ; 4, 46 μ; 5, 48 μ; 6, 48 μ; 7, 49 μ; 8, 32 μ; total length of antenna, 0.36 mm., width at segment 4, 0.033 mm.

Male.—Slightly smaller than female, with more slender abdomen; fore tarsi unarmed.

Described from 4 females and 9 males, from Carbondale, Pulaski, Riverside, and Urbana, Illinois, taken in May, June, July, September, and October, by L. M. Smith, C. A. Hart, and the writer. It occurs commonly under the loose scales of the bark on wild cherry, though taken occasionally from peach and sycamore.

It is closely related to the species described by me as *Trichothrips buffæ*, but the smaller size, longer, stouter prothorax, wider head, and stouter, differently colored antennæ, should distinguish it at once. Franklin's record[1] of the latter insect for St. Anthony Park, Minnesota, may possibly refer to the present species.

Rhynchothrips dentifer, new species. (Pl. VI, fig. 3.)

Female (*forma macroptera*).—Length about 1.5 mm. Color dark blackish brown, nearly black; tarsi and intermediate antennal segments paler.

Head slightly longer than wide, narrowest across eyes; cheeks subparallel, roundly converging to eyes from middle, base with an abrupt but slight collar-like widening; lateral and dorsal surfaces noticeably transversely striate, sparsely, briefly, and scarcely visibly spinose; vertex slightly rounded in front; postocular bristles truncate and slightly dilated at tip, equal in length to eyes. Eyes one-third as long as head, slightly longitudinally elongate as seen from above. Ocelli moderately small, situated far forward; anterior ocellus overhanging; posterior ocelli opposite anterior third of eyes. Antennæ stout, slightly more than twice as long as head, scarcely subreticulate; segment 1 scarcely broader than long; 2 rather stout, about 1.5 times as long as wide; 3 stout, clavate, about twice as long as wide; 4–6 oval, pedicellate, 1.66 times as long as wide, 4 broadest; 7 narrowed apically, pedicellate, about twice as long as wide, truncate at apex and broadly united to 8, which is sharply conical, not narrowed at base, and twice as long as wide; segments 1 and 2 nearly concolorous with body, 2 paler toward apex; 3 brownish yellow, shaded with brown at sides and in apical two-thirds; 4, 5, and 6 successively darker, with pale pedicels; 7 and 8 concolorous with body. Sense cones of moderate length, slender; segment 3 with one on outer surface; 4 with one on inner surface, two on outer, and a rudimentary one on dorsum near apex; 5 and 6 with one fully developed cone on each side and an additional rudimentary subapical one; 7 with the usual long, dorsal cone near apex. Mouth cone very slender, excessively long, fully a fifth longer than dorsum of head, reaching half across mesosternum; labrum greatly surpassing labium.

Prothorax very slightly shorter than head and (inclusive of coxæ) about 1.8 times as wide as median length of pronotum, the latter with short median thickening; all spines present, dilated and truncate at tip, the two pairs along posterior margin subequal and somewhat the longest. Ptero-

[1] Ent. News, Vol. XX, No. 5, p. 231.

thorax broader than prothorax, sides nearly straight and converging posteriorly. Wings apparently broad, of equal width throughout, slightly clouded with brownish at middle. Legs of medium length, the fore femora equal in length to head; fore tarsi armed with a short, stout tooth placed at right angles to the tarsus.

Abdomen large, broad, nearly 1.4 times as wide as prothorax, narrowing roundly from about segment 4 to base of tube. Tube nearly as long as head, slightly more than twice as long as basal width, and fully twice as wide at base as at apex, slightly contracted at both base and apex. Lateral bristles dilated and rather short, excepting for one pair each on segments 7 and 9 which are pointed and nearly as long as tube; terminal bristles about equal in length to tube, brown.

Measurements of holotype: Length 1.45 mm.; head, length 0.185 mm., width 0.172 mm.; prothorax, length 0.168 mm., width (inclusive of coxæ) 0.311 mm.; pterothorax, width 0.360 mm.; abdomen, width 0.420 mm.; tube, length 0.172 mm., width at base 0.075 mm., at apex 0.035 mm. Antennal segments: 1, 30 μ; 2, 52 μ; 3, 54 μ; 4, 57 μ; 5, 55 μ; 6, 52 μ; 7, 51 μ; 8, 30 μ; total length of antenna, 0.38 mm.; width at segment 4, 0.034 mm.

Female (*forma brachyptera*).—Apparently identical with the long winged form, with the exception of the narrower pterothorax, which is equal in width to prothorax. Abdominal segments 7 and 9 each with a pair of long, pointed, lateral bristles, as described for the macropterous form.

Described from two females taken by the writer near Baldwin, Michigan, under loose bark on a freshly-cut poplar stump, August 16 and 17, 1908.

The remarkably long mouth cone and the armed fore tarsi render this species very distinct.

Genus PHLŒOTHRIPS Haliday.

1836. *Phlæothrips* (sic!) Haliday, Ent. Mag., vol. III, p. 441.

1895. *Phloeothrips* Uzel, Monogr. d. Ordn. Thys., p. 254.

1899. *Phloeothrips* Reuter, Acta Soc. pro Fauna et Flora Fennica, vol. XVII, No. 2, p. 18.

1902. *Phlæothrips* Hinds, Proc. U. S. Nat. Mus., vol. XXVI, p. 195.

1912. *Phlæothrips* Jones, Tech. Ser. 23, pt. I, Bur. Ent., U. S. Dept. Agr., p. 21. (Gives key to North American species.)

The species *coriaceus* of Haliday must be considered the type of this genus, for it is the only recognizable one known to Haliday which has not been removed or reduced to synonomy. Its North American components—with the exception of *vittatus* and *maculatus*—form a homogeneous group remarkable for the structure of the fore leg of the male, the femur having two acute teeth on the inner side near the apex, between which when the leg is flexed, fits a similar tibial tooth. This structure is constant in more than a dozen species known to me,

and entitles them to rank as a distinct subgenus, which may be distinguished from *Phlœothrips* spp. as follows:

Subgenus HOPLANDROTHRIPS nov.

Dorsal surface, at least of pronotum, not deeply roughened. Vertex subconical, more or less produced. Genal spines not directed anteriorly from the apices of prominent tubercles. Prothorax evenly trapezoidal, with straight sides; bristles long, normal in position. Femur of male with two subapical teeth on inner side; tibia of male with a similar tooth near base.

Type: Phlœothrips (*Hoplandrothrips*) *xanthopus*, new species.

Bagnall's *Acanthothrips bidens* almost certainly belongs here, if it is not the original *Hoplothrips corticis* Amyot and Serville. In the latter event *Hoplothrips* will, of course, have priority over *Hoplandrothrips*.

Phlœothrips (Hoplandrothrips) xanthopus, new species. (Pl. VI, figs. 6, 7a, b.)

Female (*macropterous*).--Length about 1.7 mm. General color light blackish brown, with scattered maroon hypodermal pigmentation in head, thorax, and abdomen, exclusive of tube; tibiæ, tarsi, bases of intermediate antennal segments, and middle of abdomen, lemon-yellow.

Head 1.3 times as long as wide, broadest at middle; cheeks rounded abruptly to eyes and gently to near base, thence slightly diverging, forming a neck-like constriction, which is equal in width to greatest distance across eyes, or to about 0.9 greatest width of head; lateral surfaces roughened with rather deep, anastomosing lines, each cheek with about three rather stout, dark bristles arising from short tubercles; vertex subconical, produced, overhanging; postocular bristles alone prominent, equal in length to eyes, dilated and truncate at tip. Eyes about one-third as long as head, their axis of greatest dorsal length nearly coinciding with a line drawn from base of first antennal segment to anterior end of gena. Ocelli of moderate size, equidistant; anterior ocellus borne at apex of produced vertex, posterior ocelli distinctly in advance of middle of eyes. Antennæ 1.6 times as long as head, slender; segment 1 trapezoidal, broader than long; 2 about 1.75 times as long as broad; 3 clavate, twice as long as wide, deeply sinuate on inner side, pedicel curved outward; 4 clavate, narrowed at apex, equal in width to 3, broadest slightly in advance of middle, twice as long as wide; 5–7 truncate-fusiform, little wider at apex than at base, successively decreasing in length and width, 7 about 2.5 times as long as wide; 8 subconical, truncate and slightly narrowed at base; segments 1 and 2 concolorous with body; 3 yellow, clouded with brown at middle; 4–6 yellow, indefinitely shaded with brown in apical half or two-thirds; 7 and 8 brown, the pedicel of former pale. Sense cones large, fully a third as long as segment 3; formula: 3, 1-2; 4, 2-2; 5, $1\text{-}1^{+1}$; 6, $1\text{-}1^{+1}$; 7 with one on dorsum

near apex. Mouth cone slender, nearly attaining mesosternum; labium broadly rounded at tip, slightly surpassed by labrum.

Prothorax somewhat more than half as long as head and (inclusive of coxæ) about 2.2 times as wide as long; pronotum non-sculptured, anterior and posterior margins concentric; all usual bristles present, subequal, dilated at tip, and about as long as postoculars. Pterothorax slightly wider than prothorax, sides straight and converging posteriorly. Wings present. Legs moderately slender; fore tarsus with a short, stout, acute tooth.

Abdomen little, if any, broader than pterothorax, broadest toward base, thence rounded gradually to base of tube. Tube about 0.6 as long as head, about 2.3 times as long as basal width, and twice as wide at base as at apex, sides straight. Lateral bristles of moderate length, knobbed, yellowish, two pointed pairs at apex of segment 9 longer; terminal bristles about 1.5 times as long as tube, brown.

Measurements of holotype: Length 1.68 mm.; head, length 0.276 mm., width 0.212 mm.; prothorax, length 0.154 mm., width (inclusive of coxæ) 0.341 mm.; mesothorax, width across fore margin 0.360 mm.; metathorax, width across hind margin 0.312 mm.; abdomen, width 0.360 mm.; tube, length 0.172 mm., width at base 0.075 mm., at apex 0.039 mm. Antennal segments: 1, 30 μ; 2, 54 μ; 3, 76 μ; 4, 70 μ; 5, 63 μ; 6, 57 μ; 7, 52 μ; 8, 34 μ; total length of antenna, 0.44 mm.; width at segment 4, 0.033 mm.

Described from 5 females, as follows: Pulaski, Illinois, C. A. Hart, May 28, 1909, in sweepings from grass; Pulaski, Illinois, July 24, 1909, C. A. H., in woodland sweepings; St. Joseph, Illinois, May 4, 1907, C. A. H. and J. D. H., at base of mullein leaves; Urbana, Illinois, January 26, 1908, J. D. H., under bark of soft maple tree; "Millerstown, Pa., Sept. 6, on fox grape." (Pa. State Dept. Agr., Div. Zool., No. 3668).

Two males, both from Illinois, appear to belong with this species, but show so much mutual variation in the form of the fore legs that I have hesitated to include either in this preliminary description. The species bears a resemblance to Hinds's *uzeli*, but is easily separable by the much shorter tube (which is not more than 0.6 as long as the head, instead of nearly 0.8) and the longer, slenderer, and less abruptly sinuate, third segment of the antenna, which in *uzeli* is not more than 1.7 times as long as wide. This latter difference is illustrated in the accompanying figures (Pl. VI, figs. 5 and 6).

Phlœothrips (Hoplandrothrips) juniperinus, new species. (Pl. VII, figs. 5, 6.)

Female (*macropterous*).—Length about 1.5 mm. General color dark blackish brown, with a rather dense, nearly continuous layer of maroon hypodermal pigmentation in head, thorax, and abdomen, inclusive of tube; antennæ with basal two-thirds of segment 3, basal third of segment 4, and pedicel of 5, yellow.

Head not more than 1.2 (1.14 to 1.20) times as long as wide, broadest at middle; cheeks rounded abruptly to eyes and gently to near base, thence slightly diverging, forming a neck-like constriction which is about equal in width to greatest distance across eyes, or to about 0.9 the greatest width of head; lateral and dorsal surfaces very slightly roughened with shallow, anastomosing lines, each cheek with about three rather stout, dark bristles arising from short tubercles; vertex subconical, produced, overhanging; postocular bristles alone prominent, shorter than eyes, very slightly dilated and truncate at tip. Eyes about one-third as long as head, their axis of greatest dorsal length nearly coinciding with a line drawn from base of first antennal segment to anterior end of gena. Ocelli of moderate size, equidistant; anterior ocellus borne at apex of produced vertex, posterior ocelli distinctly in advance of middle of eyes. Antennæ 1.6 times as long as head, moderately slender; segment 1 trapezoidal, broader than long; 2 about 1.5 times as long as broad; 3 clavate, twice as long as wide, deeply sinuate on inner side, pedicel curved outward; 4 clavate, narrowed at apex, equal in width to 3, broadest slightly in advance of middle, twice as long as wide; 5 shorter and narrower than 4, of similar form but with straighter sides, pedicel three-fifths of apical width; 6 and 7 oblong, pedicellate, truncate at apex, apical breadth fully twice that of pedicel, 7 about one and one-half times as long as wide; 8 subconical, truncate and slightly narrowed at base. Sense cones of medium size, those on segment 3 about one-third the length of segment; formula: 3, 1–2; 4, 2–2; 5, $1\text{–}1^{+1}$; 6, $1\text{–}1^{+1}$; 7 with one on dorsum near apex. Mouth cone slender, nearly attaining mesosternum; labium broadly rounded at tip, slightly surpassed by labrum.

Prothorax somewhat more than half as long as head and (inclusive of coxæ) about 2.41 times as wide as long; pronotum non-sculptured, anterior and posterior margins concentric; all usual bristles present, short, dilated and truncate at tip, those on anterior margin about half as long as postoculars, distinctly shorter than the pair at the posterior angles, often pointed. Pterothorax slightly wider than prothorax, sides straight and converging posteriorly. Wings of fore pair colorless, distinctly broader in basal than in apical half, slightly narrowed at middle, not closely fringed (the posterior margin with only about 52 hairs), subapical fringe double for about nine hairs. Legs rather stout; fore tarsus with a short, stout, acute tooth.

Abdomen little, if any, broader than pterothorax, broadest toward base, thence rounded gradually to base of tube. Tube about 0.6 as long as head, about twice as long as basal width, and twice as wide at base as at apex, sides straight. Lateral bristles of moderate length, knobbed, yellowish, two pointed pairs at apex of segment 9 longer; terminal bristles about as long as tube, brown.

Measurements of holotype: Length 1.50 mm.; head, length 0.252 mm., width 0.215 mm.; prothorax, length 0.128 mm., width (inclusive of coxæ) 0.310 mm.; mesothroax, width across fore margin 0.342 mm.; metathorax, width across hind margin 0.280 mm.; abdomen, width 0.350 mm.; tube,

length 0.150 mm., width at base 0.072 mm., at apex 0.036 mm. Antennal segments: 1, 30 μ; 2, 51 μ; 3, 72 μ; 4, 66 μ; 5, 61 μ; 6 51 μ; 7, 40 μ; 8, 29 μ; total length of antenna, 0.40 mm., width at segment 4, 0.035 mm.

Male.—Length about 1.3 mm. Head longer than in female, about 1.3 times as long as wide. Fore femora and tibiæ swollen; tarsal tooth stronger. Prothoracic and postocular bristles much longer than in female, the pair at the anterior angles subequal in length to postoculars, which are fully as long as eyes.

Described from 4 females and 2 males, taken by the writer from branches of red cedar (*Juniperus virginiana* L.), on Plummer's Island, Maryland (in the Potomac River near Washington, D. C.), May 19, 1912.

The coloration of the antennæ, taken in conjunction with their structure and the form of the head, would seem to indicate a very distinct species. It belongs, however, to a group in which specific separation is largely opinionative.

Phlœothrips (Hoplandrothrips) funebris, new species. (Pl. VII, figs. 1-4.)

Female (*macropterous*).—Length about 1.4 mm. Color uniform dark-blackish brown, tarsi and apices of fore tibiæ yellowish; maroon hypodermal pigmentation nearly continuous in head, thorax, and abdomen, inclusive of tube.

Head about 1.2 times as long as wide, broadest at middle; cheeks rounded abruptly to eyes and gently to near base, thence slightly diverging, forming a neck-like constriction which is equal in width to greatest distance across eyes, or to about 0.9 greatest width of head; lateral surfaces very slightly roughened with shallow, anastomosing lines, each cheek with about three rather stout, dark bristles arising from short tubercles; vertex subconical, produced, overhanging; postocular bristles alone prominent, equal in length to eyes, dilated and truncate at tip. Eyes about one-third as long as head, their axis of greatest dorsal length nearly coinciding with a line drawn from base of first antennal segment to anterior end of gena. Ocelli of moderate size, equidistant; anterior ocellus borne at apex of produced vertex, posterior ocelli distinctly in advance of middle of eyes. Antennæ 1.6 times as long as head, moderately slender; segment 1 trapezoidal, broader than long; 2 about 1.7 times as long as broad; 3 clavate, swollen apically, scarcely more than 1.7 times as long as wide, not deeply sinuate on inner side, pedicel not curved outward; 4 clavate, swollen, narrowed at apex, often narrower than 3, broadest slightly in advance of middle, 1.7 times as long as wide; 5 not swollen, rather abruptly narrower than 4, broadest at middle; 6 and 7 oblong, pedicellate, truncate at apex, apical breadth about twice that of pedicel, 6 broadest at middle, 7 broadest behind middle and about twice as long as wide; 8 subconical, truncate and slightly narrowed at base. Sense cones large, those on segment 3 one-half the length of segment; formula: 3, 1-2; 4, 2-2; 5, $1\text{-}1^{+1}$; 6, $1\text{-}1^{+1}$;

7 with one on dorsum near apex. Mouth cone slender, nearly attaining mesosternum; labium broadly rounded at tip, slightly surpassed by labrum.

Prothorax somewhat more than half as long as head and (inclusive of coxæ) about 2.4 times as wide as long; pronotum non-sculptured, anterior and posterior margins concentric; all usual bristles present, subequal and dilated at tip, about as long as postoculars. Pterothorax usually slightly wider than prothorax, sides straight and converging posteriorly. Wings more or less clouded with brown, distinctly broader in basal than in apical half, slightly narrowed at middle, not closely fringed (the posterior margin with only about 52 hairs), subapical fringe double for about nine hairs. Legs rather stout; fore tarsus with a short, stout, acute tooth.

Abdomen little, if any, broader than pterothorax, broadest toward base, thence rounded gradually to base of tube. Tube about half as long as head, about twice as long as basal width, and slightly less than twice as wide at base as at apex, sides straight. Lateral bristles long, three-fifths the length of tube, knobbed, yellowish, two pointed pairs at apex of segment 9 longer; terminal bristles about 1.5 times as long as tube, brown.

Measurements of holotype: Length 1.38 mm.; head, length 0.228 mm., width 0.197 mm.; prothorax, length 0.124 mm., width (inclusive of coxæ) 0.292 mm.; mesothorax, width at anterior margin 0.292 mm.; metathorax, width at posterior margin 0.246 mm.; abdomen, width 0.300 mm.; tube, length 0.120 mm., width at base 0.056 mm., at apex 0.036 mm. Antennal segments: 1, 24 μ; 2, 48 μ; 3, 54 μ; 4, 57 μ; 5, 51 μ; 6, 47 μ; 7, 42 μ; 8, 29 μ; total length of antenna, 0.35 mm., width at segment 4, 0.033 mm.

Male.—Length about 1.3 mm. Head very slightly, if any, longer than in female. Fore femora and tibiæ swollen; tarsal tooth stronger. Prothoracic and postocular bristles longer than in female, the pair at the anterior angles unusually long, much longer than the eyes.

Described from 14 females and 1 male, as follows:—Illinois: Carbondale, October 12 and 15, 1908, L. M. Smith, on branches of sycamore and post oak (*Quercus stellata* Wang.); Anna, October 26, 1908, L. M. S., on branch of sycamore; Monticello, August 1, 1908, C. A. Hart, on branch of willow birch; Pulaski, October 27 and 28, 1908, L. M. S., on branch of white oak (*Quercus alba* L.) and swamp oak (*Q. palustris* Muench.). Missouri: Wittenberg, July 12, 1909, C. A. H., on branch of walnut. Maryland: Plummer's Island (in the Potomac River near Washington, D. C.), May 19, 1912, W. L. McAtee and J. D. H., on branch of *Quercus* sp. District of Columbia: Washington, July 28, 1912, J. D. H., on branch of yellow locust (*Robinia pseudacacia* L.).

Type locality: Carbondale, Illinois.

This species is one of the commonest and most widely distributed ones of the genus. Mr. A. C. Morgan has shown me a specimen from Florida, in the collection of the Bureau of

Entomology. The coloration of the antennæ is very constant and characteristic, as is also the form of the third antennal segment. Rarely the lower and outer margins of all the intermediate segments are slightly paler and of a yellowish brown color.

Phlœothrips (Hoplandrothrips) microps, new species. (Pl. VII, figs. 7, 8.)

Female (forma macroptera).—Length about 1.6 mm. General color dark blackish brown, with a rather dense, nearly continuous layer of maroon hypodermal pigmentation in head, thorax, and abdomen, inclusive of tube; antennæ with basal half of segment 3 yellow, and pedicels of 4–6 yellow or gray.

Head about 1.2 times as long as wide, fully twice as long as prothorax; cheeks very slightly arched, subparallel, converging roundly and rather abruptly to eyes and rather slightly to base, which is about a tenth broader than greatest distance across eyes and without evident neck-like constriction; lateral surfaces very slightly roughened with shallow, anastomosing lines, each cheek with about six rather stout, dark bristles arising from short tubercles; vertex rounded, scarcely conical, produced, overhanging; postocular bristles distinctly longer than eyes, dilated and truncate at tip; dorsum with a pair of long accessory bristles nearly equal in length to postoculars and of similar form, situated midway between posterior margin of eyes and base of head. Eyes very slightly less than one-fourth as long as head, subcircular as seen from above. Ocelli of moderate size, equidistant, anterior ocellus borne at tip of vertex, posterior ocelli opposite or behind centers of eyes. Antennæ nearly 1.6 times as long as head, slender; segment 1 trapezoidal, broader than long; 2 nearly twice as long as broad; 3 clavate, 2.4 times as long as greatest width, deeply sinuate on inner side, pedicel curved outward; 4 clavate, slightly wider than 3, fully twice as long as broad, widest at apical third; 5 shorter and narrower than 4, of nearly similar form, but with shorter pedicel and straighter sides, pedicel four-fifths of apical width; 6 and 7 oblong, pedicellate, truncate at apex, apical breadth fully twice that of pedicels, 6 broadest toward apex, 7 broadest toward base and about twice as long as wide; 8 conical, truncate, not narrowed at base, broadly united to 7. Sense cones short, those on segment 3 about one-fourth the length of segment; formula: 3, 1–1; 4, 1–2; 5, $1\text{–}1^{+1}$; 6, $1\text{–}1^{+1}$; 7 with one on dorsum near apex. Mouth cone slender, nearly attaining mesosternum; labium broadly rounded at tip, slightly surpassed by labrum.

Prothorax not more than half as long as head and (inclusive of coxæ) about 2.5 times as wide as long; pronotum non-sculptured, anterior margin roundly subangulate at middle; all usual bristles present, slightly dilated and truncate at tip, anterior marginals short, half as long as postoculars; other bristles subequal in length to postoculars or with the pair at the anterior angles slightly shorter. Pterothorax slightly wider than prothorax,

sides straight and converging posteriorly. Wings colorless, distinctly broader in basal than in apical half, slightly narrowed at middle, not closely fringed (the posterior margin with only about 52 hairs), subapical fringe double for about nine hairs. Legs rather stout, fore tarsus with a short, stout, acute tooth.

Abdomen little, if any, broader than pterothorax, broadest toward base, thence rounded gradually to base of tube. Tube about 0.6 as long as head, 2.3 times as long as basal width, about 1.8 times as wide at base as at apex, sides straight. Lateral bristles of moderate length, knobbed, yellowish, two pointed pairs at apex of segment 9 longer; terminal bristles about as long as tube, brown.

Measurements of holotype: Length 1.64 mm.; head, length 0.288 mm., width 0.234 mm.; prothorax, length 0.139 mm., width (inclusive of coxæ) 0.352 mm.; mesothorax, width across fore margin 0.396 mm.; metathorax, width across hind margin 0.354 mm.; abdomen, width 0.414 mm.; tube, length 0.174 mm., width at base 0.075 mm., at apex 0.042 mm. Antennal segments: 1, 33 μ; 2, 54 μ; 3, 78 μ; 4, 75 μ; 5, 69 μ; 6, 54 μ; 7, 48 μ; 8, 31 μ; total length of antenna, 0.44 mm., width at segment 4, 0.035 mm.

Female (forma brachyptera).—Apparently identical with the winged form in all points of structure; pterothorax perhaps slightly smaller and weaker.

Male (forma brachyptera).—Length about 1.3 mm. Head very slightly longer than in female, about 1.3 times as long as wide; postocular bristles nearly half as long as head, invariably bent at middle and curving forward. Femora and tibiæ swollen; tarsal tooth large, nearly straight, about two-thirds as long as eye. Prothoracic bristles scarcely longer than in female.

Described from 13 females (of which four are brachypterous) and 8 males, all from Illinois, as follows: Cherry Valley, August 14, 1909, Hugh Glasgow, 2 brachypterous females, "in old mines of Scolytids"; Desplaines, September 5, 1908, J. J. Davis, 1 male under bark on apple tree; Dubois, October 1, 1908, L. M. Smith, 1 brachypterous female on hickory branch; Dubois, July 13, 1909, C. A. Hart, 1 male on hackberry; Grand Tower, June 30, 1909, C. A. H., 1 macropterous female on locust; Odin, September 29, 1908, L. M. S., 1 brachypterous female on hackberry; Parker, July 14, 1909, C. A. H., 1 macropterous female on willow; "Marion, 1909, reared from galls on twigs of pin oak (*Quercus palustris* Muench.), taken July 18 by W. P. Flint, adults found August 18 in breeding cage by James Zetek, Exp. 4499 Ill. State Lab. Nat. Hist.", 6 macropterous females and 5 males; Southern Illinois, C. A. H., from elm covered with trumpet creeper (*Tecoma radicans* (L.) Juss.).

Type locality: Marion, Illinois.

This is an anomalous member of its genus, and may easily be known by the rounded vertex, the peculiarly shaped head

with a pair of long, knobbed bristles on dorsum, and by the number and disposition of the sense cones. It approaches the genus *Cryptothrips* in several points of structure. The male is of special interest in that the postocular bristles, instead of those at the anterior prothoracic angles, are increased in length, which is in marked contrast to a reverse tendency shown in the other species.

Phlœothrips (Hoplandrothrips) insolens, new species. (Pl. V, fig. 4; VIII, figs. 1-3.

Female (*macropterous*).—Length about 1.7 mm. General color dark blackish brown, with sparse, irregular, maroon pigmentation in head, thorax, and abdomen, exclusive of tube; antennæ with basal half of segment 3 yellow, and pedicels of 4–6 yellow or gray; tibiæ and tarsi pale lemon-yellow.

Head about 1.5 times as long as wide, fully 2.6 times as long as prothorax; sides subparallel, converging roundly to eyes, slightly diverging at base, which is noticeably wider than greatest distance across eyes and without evident neck-like constriction; lateral surfaces noticeably subreticulate, each cheek with about four rather stout, dark bristles arising from short tubercles; vertex subconical, produced and overhanging; postocular bristles equal in length to eyes, dilated and truncate at tip; middle of dorsum with a pair of pointed accessory bristles half as long as postoculars. Eyes about one-fifth as long as head, subcircular as seen from above. Ocelli of moderate size, equidistant; anterior ocellus borne at tip of vertex, posterior ocelli opposite or in front of centers of eyes. Antennæ about 1.3 times as long as head, slender; segment 1 trapezoidal, broader than long; 2 scarcely twice as long as broad; 3 clavate, about twice as long as its greatest width, distinctly sinuate on inner side, pedicel curved slightly outward; 4 clavate, subequal in width to 3, fully twice as long as wide, broadest beyond middle; 5 slightly shorter and narrower than 4, of nearly similar form; 6 and 7 oblong, pedicellate, truncate at apex, broadest about middle, 7 twice as long as wide; 8 sublanceolate, briefly and very distinctly pedicellate. Sense cones short, those on segment 3 less than one-third the length of the segment; formula: 3, 1–2; 4, 1–2; 5, $1\text{–}1^{+1}$; 6, $1\text{–}1^{+1}$; 7 with one of dorsum near apex. Mouth cone slender, nearly attaining mesosternum, labium broadly rounded at tip, slightly surpassed by labrum.

Prothorax a little less than 0.4 as long as head and (inclusive of coxæ) fully two and one-half times as wide as long; pronotum non-sculptured, anterior and posterior margins nearly concentric; all usual bristles present, slightly dilated and truncate at tip, anterior marginals short, half as long as postoculars, other bristles subequal in length to postoculars, or the pair at the anterior angles slightly shorter. Pterothorax slightly wider than prothorax, sides straight and converging posteriorly. Wings uniform brownish yellow, probably of normal structure, subapical fringe double for about eight hairs. Legs rather stout, fore tarsi without trace of tooth.

Abdomen little, if any, broader than pterothorax, broadest toward base, thence rounded gradually to base of tube; tube 0.6 as long as head, 2.8 times as long as basal width, slightly less than twice as wide at base as at apex, sides straight except for a slight constriction at basal fourth. Lateral bristles of moderate length, knobbed, yellowish, two pointed pairs at apex of segment 9 longer; terminal bristles about equal in length to tube, brown.

Measurements of holotype: Length 1.68 mm.; head, length; 0.318 mm., width across middle 0.216 mm.; prothorax, length 0.120 mm., width (inclusive of coxæ) 0.307 mm.; mesothorax, width across fore margin 0.338 mm.; metathorax, width across hind margin 0.300 mm.; abdomen, width 0.348 mm; tube, length 0.192 mm., width at base 0.069 mm., at apex 0.038 mm. Antennal segments: 1, 30 μ; 2, 54 μ; 3, 70 μ; 4, 65 μ; 5, 63 μ; 6, 54 μ; 7, 47 μ; 8, 39 μ; total length of antenna, 0.42 mm.; width at segment 4, 0.031 mm.

Described from one female taken on elm at Dubois, Illinois, July 3, 1909, by Mr. Charles A. Hart.

The unarmed fore tarsus, if constant, is a remarkable character, occurring nowhere else in the genus. The sculpture of the head, the pedicellate last segment of the antenna, the slender tube, and the coloration of the legs, all tend to make this a very isolated species.

Genus CRYPTOTHRIPS Uzel.

Cryptothrips longiceps, new species. (Pl. VIII, fig. 5.)

Female (forma brachyptera).—Length about 2.2 mm. Color dark blackish brown or black, with pedicel of third antennal segment yellow.

Head rectangular, about 1.65 times as long as wide, sides perfectly parallel; lateral and dorsal surfaces subreticulate toward base, set with several short spines and a longer pair at middle of dorsum; vertex truncate; postocular and postocellar bristles long, pointed, subequal; a minute bristle each side of median ocellus and a much longer pair external to these. Eyes moderate in size, not protruding, occupying the anterior angles of the head, and, seen from above, quadrangular in form, their caudad and mediad margins forming nearly a right angle. Ocelli small, about equal in size to facets of eyes; anterior ocellus nearly overhanging; posterior ocelli opposite center of eyes and almost touching their inner margins. Antennæ 1.5 times as long as head, of normal form and structure (Pl. VIII, fig. 5). Mouth cone slightly wider than long, reaching nearly to posterior margin of prosternum; tip of labrum just attaining tip of broadly rounded labium.

Prothorax about two-thirds as long as width of head, and (inclusive of coxæ) about 2.5 times as wide as long, without median thickening; usual spines all present, nearly pointed, the two pairs near the posterior angles much the longest, all others moderately short. Pterothorax slightly wider than prothorax; sides subparallel. Legs concolorous with body; fore tarsus unarmed.

Abdomen stout, heavy, about 1.4 times as broad as pterothorax, widest at about segment 3, thence tapering roundly to base of tube. Tube slightly more than 0.6 as long as head, slightly constricted just before apex, which is about half as wide as base. Lateral bristles on segment 9 as long as tube; terminal bristles about three-fourths as long as tube.

Measurements of holotype: Length 2.17 mm.; head, length 0.396 mm., width 0.240 mm.; prothorax, length along median dorsal line 0.156 mm., width (inclusive of coxæ) 0.396 mm.; pterothorax, width 0.420 mm.; abdomen, width 0.600 mm.; tube, length 0.248 mm., width at base 0.099 mm., at apex 0.051 mm. Antennal segments: 1, 48 μ; 2, 75 μ; 3, 102 μ; 4, 97 μ; 5, 88 μ; 6, 78 μ; 7, 55 μ; 8, 48 μ; total length of antenna, 0.59 mm., width at segment 4, 0.042 mm.

Male (forma brachyptera).—Length about 1.68 mm. Color and general structure nearly as in female. Head distinctly shorter than combined lengths of segments 1–5 of antennæ. Pronotum with front margin evenly rounded, no median chitinous thickening; fore femora slightly less than 0.6 as long as head; fore tarsi armed with a large, stout tooth.

Measurements of allotype: Length 1.68 mm.; head, length 0.328 mm., width 0.200 mm.; prothorax, length along median dorsal line 0.150 mm., width (inclusive of coxæ) 0.352 mm.; pterothorax, width 0.384 mm.; abdomen, width 0.504 mm; tube, length 0.210 mm., width at base 0.084 mm., at apex 0.045 mm. Antennal segments: 1, 39 μ; 2, 63 μ; 3, 85 μ; 4, 82 μ; 5, 79 μ; 6, 65 μ; 7, 48 μ; 8, 44 μ; total length of antenna, 0.51 mm., width at segment 4, 0.038.

Described from 2 females and 1 male, all from Illinois, as follows: Carbondale, September 21, 1908, 1 female and 1 male, on peach branch, L. M. Smith; Parker, July 14, 1909, 1 female, on hickory branch, C. A. Hart.

Though resembling *C. carbonarius* in the elongate head and the arrangement of the cephalic and prothoracic bristles, this species is of quite different appearance and much smaller size. In *carbonarius*, of which the female is unknown, the fore femora of the winged male are about 0.8 as long as the head, which is about equal to the length of the first five antennal segments; in the present species the femora of the male are less than 0.6 as long as the head, and the latter is distinctly shorter than the first five antennal segments.

Cryptothrips exiguus, new species. (Pl. VIII, fig. 4.)

Female (forma macroptera).—Length about 1 mm. General color dark luteous, with abdomen blackish brown; internal pigment irregular, maroon in color; head and thorax darkened at sides with blackish; legs concolorous with lighter portions of body, tarsi and apical portion of tibiæ dull yellow; antennæ nearly uniform gray.

Head about 1.25 times as long as wide, sides straight and nearly parallel; vertex produced, slightly overhanging, bluntly conical; lateral and dorsal

surfaces almost without sculpture, set with a few short, weak spines arising from barely perceptible elevations; postocular bristles alone prominent, about one and one-third times as long as eyes, dilated at tip; postocellar bristles minute. Eyes small, retracted, but little more than one-fifth as long as head, nearly circular as seen from above. Ocelli of moderate size; median ocellus situated on dorsum of apex of produced vertex, slightly in advance of anterior margin of eyes; posterior ocelli opposite anterior third of eyes, nearly touching their inner margins, and slightly more distant from each other than from the anterior ocellus. Antennæ just one and two-thirds times as long as head, more slender than usual; segment 1 slightly broader than long; 2 about 1.6 times as long as wide; 3 clavate, twice as long as wide, broader at apical third, pedicel narrow, not more than one-fifth greatest width of segment; 4-7 slightly more than twice as long as wide, truncate-fusiform, with short pedicels; 8 three times as long as wide, oblong-conical, slightly narrowed at base; antennæ nearly uniform blackish gray, segments 1 and 2 darker; 3 paler in basal two-thirds. Mouth cone wider than long, reaching posterior margin of prosternum; tip of labrum just attaining tip of broadly rounded labium.

Prothorax about half as long as head and (inclusive of coxæ) about two and one-third times as wide as long; pronotum non-sculptured, without median thickening; anterior and posterior margins concentric; usual bristles all present, very slender, subequal in length to postoculars, slightly dilated at tip. Pterothorax slightly wider than prothorax, sides straight, converging posteriorly. Wings present (not spread in the single example), sparsely fringed. Legs rather slender; fore tarsi unarmed.

Abdomen moderately slender, only slightly broader than pterothorax, broadest at about segment 3, thence tapering roundly to base of tube; tube evenly tapering, slightly more than half as long as head and less than twice as long as basal width, which is more than twice the apical. Lateral bristles on segment 9 fully as long as tube, slightly longer than terminal bristles.

Measurements of holotype: Length 1.03 mm.; head, length 0.192 mm., width 0.156 mm.; prothorax, length 0.100 mm., width (inclusive of coxæ) 0.238 mm.; pterothorax, width 0.264 mm.; abdomen, width 0.282 mm.; tube, length 0.108 mm., width at base 0.062 mm., at apex 0.027 mm. Antennal segments: 1, 27 μ; 2, 42 μ; 3, 48 μ; 4, 45 μ; 5, 47 μ; 6, 44 μ; 7, 41 μ; 8, 27 μ; total length of antenna, 0.32 mm., width at segment 4, 0.023 mm.

Described from 1 female taken in sweepings at Grand Tower Illinois, July 12, 1909, by Mr. Charles A. Hart.

This species is abundantly distinguished by its small size, the form of the antennal segments, and the long, blunt, postocular and prothoracic bristles. In several respects it shows an interesting approach to the genus *Phlœothrips*.

Genus GASTROTHRIPS nov.

(γαστήρ, the abdomen; θρίψ, a wood worm.)

Head little, if any, longer than wide, rounded in front, vertex evenly declivous; cheeks rounded, with a few short spines, which are sometimes stout and raised upon barely visible tubercles. Eyes small or moderate, subquadrangular, their caudad and mediad margins forming a more or less evident right angle; interval between eyes much more than their own dorsal width. Ocelli of posterior pair widely separated, nearly contiguous to inner margins of eyes. Antennæ eight-segmented; intermediate segments produced beneath in a subtriangular process; last segment slender, subpedicellate. Mouth cone broad, nearly attaining posterior margin of prosternum; labium semicircularly rounded at apex, subequal in length to labrum. Pronotum shorter than head, trapezoidal, twice as broad across posterior angles (inclusive of coxæ) as median dorsal length; posterior and anterior margins concentric. Legs moderate; fore tarsi sometimes armed. Wings, when present, slender, not closely fringed, without double subapical fringe on posterior margin. Abdomen moderate or heavy; tube short to medium, more or less abruptly constricted at apex.

Type: Gastrothrips ruficauda, new species.

As above defined, this genus will prove a moderately large one, comprising species which for the most part live under bark—principally, it seems, in the southern States. In addition to the two species herein described as new, two or three others are known to me from uniques. All resemble the species of *Cryptothrips* in no slight degree, especially in the form and structure of the mouth cone, antennæ, and eyes. They constitute, however, a distinct type of radically different facies, recognized at once by the shorter head and the abruptly constricted tube.

Gastrothrips ruficauda, new species. (Pl. VIII, figs. **6**, **7**.)

Female (forma brachyptera).—Length about 1.4 mm. General color dark blackish brown or black, thorax slightly paler; antennal segments 1 and 2 blackish brown, the latter paler apically, where it is concolorous with pedicel of 3, the remainder of antenna almost jet black, even in balsam mounts; apical half of all femora and middle portion of fore tibiæ pale yellowish, sometimes nearly white, the remainder of legs dark blackish brown, tarsi paler; tube abruptly bright brown-red, with apex black.

Head slightly wider than long, rounded in front, broadest midway between eyes and base, vertex evenly declivous; lateral and dorsal surfaces without sculpture, set with a few short, rather stout spines; postocular bristles alone prominent, sometimes half as long as head, pointed; postocellar bristles minute. Eyes small, not protruding, subquadrangular, their caudad and mediad margins forming a more or less evident right angle,

on ventral surface of head angulate posteriorly and slightly prolonged; interval between eyes about twice their own dorsal width. Ocelli small; anterior ocellus scarcely overhanging; posterior ocelli much more distant from each other than from the anterior ocellus, nearly contiguous to eyes and slightly posterior to their anterior third. Antennæ about twice as long as head, formed much as in *Cryptothrips;* segment 1 trapezoidal, fully as broad as long; 2 about two-thirds as wide as long; 3 clavate, twice as long as greatest width, thrice as wide as pedicel at base, sides almost straight; 4 distinctly shorter and stouter, two-thirds as wide as long; 5 slightly longer than 4, of similar form and equal width; 6 equal and similar to 5 but slightly narrower; 7 distinctly shorter, 0.7 as broad as 4, broadest near base, truncate at apex, pedicellate; 8 slender, only slightly shorter than 7, broadest at basal two-fifths, ventral surface with about six comb-like bristles. Mouth cone broad, nearly attaining posterior margin of prosternum; labium semicircularly rounded at apex, subequal in length to labrum.

Prothorax about 0.7 as long as head and (inclusive of coxæ) about 2.3 times as wide as long; pronotum non-sculptured, without median thickening; anterior and posterior margins concentric; all usual bristles present, pointed, the anterior marginals greatly reduced and scarcely visible, the two pairs at the posterior angles much the longest, about four times as long as midlaterals and the pair at the anterior angles. Pterothorax reduced, about as long as prothorax, sides nearly parallel. Legs short, rather stout; fore tarsi unarmed.

Abdomen stout, nearly 1.5 times as wide as prothorax, broadest at about segment 5, thence rounded evenly to base of tube. Tube about 0.8 as long as broad, twice as long as basal width, very abruptly constricted at apex, where it is half as wide as at base, intermediate portion slightly tapering. Lateral bristles on segments 6–9 fully as long as tube, nearly black; terminal bristles two-thirds as long as tube.

Measurements: Length 1.36 mm.; head, length 0.184 mm., width 0.208 mm.; prothorax, length 0.136 mm., width (inclusive of coxæ) 0.316 mm.; pterothorax, width 0.336 mm.; abdomen, width 0.452 mm.; tube, length 0.152 mm., width at base 0.079 mm., at apex 0.036 mm. Antennal segments: 1, 33 μ; 2, 54 μ; 3, 60 μ; 4, 50 μ; 5, 54 μ; 6, 54 μ; 7, 41 μ; 8, 38 μ; total length of antenna, 0.384 mm., width at segment 4, 0.033 mm.

Described from 3 females taken from branches of grape, sycamore, and overcup oak (*Quercus lyrata* Walt.), respectively, at Grand Tower and Pulaski, Illinois, by C. A. Hart and L. M. Smith, in October and July.

The broad head, unarmed fore tarsi, and the short, red tube should serve to distinguish this species from the following.

Gastrothrips texanus, new species. (Pl. IV, fig. 7.)

Female (forma macroptera).—Length about 1.4 mm. General color dark blackish brown, nearly black posteriorly; antennal segments 1 and 2

blackish brown, the latter paler apically, where it is concolorous with pedicel of 3, the remainder of antenna almost black; extreme apex of all femora, middle portion of fore tibiæ, and the fore tarsi pale yellowish, the remainder of legs concolorous with body; tube jet black, opaque.

Head about as broad as long, rounded in front, broadest midway between eyes and base, vertex evenly declivous; lateral and dorsal surfaces without sculpture, set with a few short, stout, brown spines, which are raised upon barely visible tubercles; postocular bristles alone prominent, a little more than one-third as long as head, nearly pointed, postocellar bristles minute. Eyes small, not protruding, subquadrangular, on ventral surface of head rounded posteriorly and not prolonged; interval between eyes about twice their own dorsal width. Ocelli moderate in size; anterior ocellus scarcely overhanging; posterior ocelli much more distant from each other than from the anterior ocellus, nearly contiguous to eyes and slightly posterior to their anterior third. Antennæ about twice as long as head, of nearly identical structure with those of the preceding species. Mouth cone broad, nearly attaining posterior margin of prosternum; labium semicircularly rounded at apex, subequal in length to labrum.

Prothorax about 0.64 as long as head and (inclusive of coxæ) about 2.4 times as wide as long; pronotum non-sculptured, with slight median thickening; anterior and posterior margins concentric; all usual bristles present, all except the two pairs near the posterior angles greatly reduced in size, midlaterals longer, inner posterior pair half as long as the nearly pointed outer pair. Pterothorax with sides nearly straight, converging posteriorly. Fore wings of nearly equal width throughout, about ten times as long as wide, without double, subapical fringe on posterior margin, lightly washed with brown, darker at base. Legs of medium length, moderately stout; fore tarsi armed with a long, slightly curved, acute tooth.

Abdomen moderately slender, about 1.3 times as broad as prothorax, broadest at about segment 5, thence rounded evenly to base of tube. Tube fully as long as head, about 2.5 times as long as basal width, abruptly constricted at apex, where it is half as wide as at base; intermediate portion tapering only slightly. Lateral bristles on segments 7 and 9 nearly as long as tube, brownish yellow in color; terminal bristles about half as long as tube.

Measurements of holotype: Length 1.40 mm.; head, length 0.198 mm., width 0.196 mm.; prothorax, length 0.127 mm., width (inclusive of coxæ) 0.308 mm.; pterothorax, width 0.348 mm.; abdomen, width 0.396 mm.; tube, length 0.204 mm., width at base 0.081 mm., at apex 0.041 mm. Antennal segments: 1, 33 μ; 2, 57 μ; 3, 60 μ; 4, 53 μ; 5, 54 μ; 6, 54 μ; 7, 42 μ; 8, 36 μ; total length of antenna, 0.38 mm.; width at segment 4, 0.031 mm.

Described from 1 female taken by Mr. Hart on huisache (*Acacia farnesiana* Willd.), at Brownsville, Texas, June 29, 1908.

This species should easily be known from the preceding by the longer, narrower head, the armed fore tarsus, and the long, black tube, which is fully as long as the head.

EXPLANATION OF PLATES.

PLATE IV.

FIG. 1. *Æolothrips vittipennis* sp. nov. Head and prothorax, female, showing sculpture of portion of occiput; ×93.
2. *Æolothrips vittipennis*. Left antenna, female; ×231.
3. *Æolothrips fasciatus* Linné. Left antenna, female; ×231.
4. *Æolothrips bicolor* Hinds. Left antenna, female; ×231.
5. *Æolothrips crassus* sp. nov. Right antenna, female; ×206. (Sense areas not shown on segments 3 and 4.)
6. *Æolothrips crassus*. Head and prothorax, female; ×93.
7. *Gastrothrips texanus* sp. nov. Tip of abdomen, female; ×94.

PLATE V.

FIG. 1. *Merothrips morgani* gen. et sp. nov. Right antenna, female; ×402.
2. *Merothrips morgani*. Portion of head and prothorax, male; ×352.
3. *Merothrips morgani*. Right hind leg, female; ×352.
4. *Phlœothrips* (*Hoplandrothrips*) *insolens* sp. nov. Portion of occiput, showing sculpture; ×352. (See also Pl. VIII, figs. 1–3.)
5. *Thrips pallicornis* sp. nov. Head and prothorax, female; × 93.
6. *Thrips pallicornis*. Right antenna, female; ×206.
7. *Frankliniella stylosa* sp. nov. Right antenna, female; ×206.

PLATE VI.

FIG. 1. *Zygothrips pallidus* sp. nov. Head and prothorax, male; × 120.
2. *Zygothrips pallidus*. Left antenna, male; ×352.
3. *Rhynchothrips dentifer* sp. nov. Head and prothorax, macropterous female; ×74.
4. *Rhynchothrips pruni* gen. et sp. nov. Head and prothorax, female; ×74.
5. *Phlœothrips* (*Hoplandrothrips*) *uzeli* Hinds. Segment 3 of right antenna, female; ×352.
6. *Phlœothrips* (*Hoplandrothrips*) *xanthopus* subgen. et sp. nov. Segment 3 of right antenna, female; ×352.
7a. *Phlœothrips* (*Hoplandrothrips*) *xanthopus*. Head and prothorax, female; ×74.
7b. *Phlœothrips* (*Hoplandrothrips*) *xanthopus*. Left fore tarsus, female; ×74.

Plate VII.

FIG. 1. *Phlæothrips* (*Hoplandrothrips*) *funebris* sp. nov. Head and prothorax, female; ×81.

2. *Phlæothrips* (*Hoplandrothrips*) *funebris*. Right antenna, female; ×248.

3. *Phlæothrips* (*Hoplandrothrips*) *funebris*. Right fore leg, male; ×248.

4. *Phlæothrips* (*Hoplandrothrips*) *funebris*. Segment 3 of right antenna, female; ×352.

5. *Phlæothrips* (*Hoplandrothrips*) *juniperinus* sp. nov. Segment 3 of right antenna, female; ×352.

6. *Phlæothrips* (*Hoplandrothrips*) *juniperinus*. Head and prothorax, female; ×74.

7. *Phlæothrips* (*Hoplandrothrips*) *microps* sp. nov. Segment 3 of right antenna, female; ×352.

8. *Phlæothrips* (*Hoplandrothrips*) *microps*. Head and prothorax, female; ×74.

Plate VIII.

FIG. 1. *Phlæothrips* (*Hoplandrothrips*) *insolens* sp. nov. Head and prothorax, female; ×74.

2. *Phlæothrips* (*Hoplandrothrips*) *insolens*. Segment 3 of right antenna, female; ×352.

3. *Phlæothrips* (*Hoplandrothrips*) *insolens*. Segments 7 and 8 of right antenna, female; ×352.

4. *Cryptothrips exiguus* sp.nov. Head and prothorax, female; ×95.

5. *Cryptothrips longiceps* sp. nov. Head and prothorax, female; ×74.

6. *Gastrothrips ruficauda* gen. et sp.nov. Head and prothorax, female; ×74.

7. *Gastrothrips ruficauda*. Tip of abdomen, female; ×74.

SYMPHOROMYIA AS A BLOOD-SUCKER.

(Diptera, Leptidæ.)

BY FREDERICK KNAB and R. A. COOLEY.

When preparing his paper on blood-sucking Leptidæ* the senior author was unable to find more than the single original observation, by Osten Sacken, of the biting habit in *Symphoromyia*. As the result of conversation, during the last meeting of the American Association for the Advancement of Science, and subsequent correspondence, Professor Cooley sent him specimens taken in the act of biting, together with the notes reproduced below. Three specimens with the number 143 attached, taken at Sedan, Montana, July 1, 1906, are all females of the same species. The material came to hand too late to be incorporated in the above-mentioned paper.

As it is evident that the blood-sucking habit in *Symphoromyia* is confined to certain species, perhaps a single one, the determination of specimens that have actually bitten is of considerable interest. There was some difficulty in determining the specimens, as it proved that *Symphoromyia* is systematically in a rather unsatisfactory condition. However, the specimens fit very well the description given by Williston for the female of his *Symphoromyia pachyceras*. The proximity of the two regions, northern California for Williston's specimens and southwestern Montana for Professor Cooley's, make the agreement reasonably probable. Whether Osten Sacken had the same species under observation probably can only be determined by examining the original specimens, if these are still in existence. We have been unable to trace the locality, Webber Lake, California, given by Osten Sacken, and, moreover, we know very little of the distribution of the species of *Symphoromyia*. Attention must be called to the fact that the specimen standing as *S. pachyceras* in the National Museum collection, and upon which Coquillett based his diagnosis, are not Williston's species. This is evident from the shining black abdomen. Williston describes his species as "gray pollinose," indicating this condition for both thorax and abdomen; in this the Montana specimens agree. The color of the third antennal joint, palpi, and legs, which have been freely used in differentiating the species of this genus, are, as might be expected, subject to some variation which probably depends not only upon age, but also upon food.

There is considerable diversity in the mouth-parts of different species of *Symphoromyia*. The specimens taken by the junior author have rather short mouth-parts with a broad,

*This volume, pp. 108–109.

fleshy labial sheath which evidently can be retracted, similarly to the sheath of mosquitoes; this sheath is very thick at the sides and there is a central depression in which the other mouth-parts lie. The piercing parts are strongly chitinized and the maxillæ are clothed on their ventral surfaces with minute stiff hairs which on the apical half become transformed into barbs, densest and stoutest at the apex. In *Symphoromyia cruenta* Coquillett the mouth-parts are much longer, the labial sheath much more slender, apparently for the most part well chitinized, and closely surrounds the other parts, which are only exposed through a narrow dorsal slit. The maxillæ are smooth to near the apex, where there is a dense group of strong barbs. Coquillett in his "synopsis" already indicated this difference, but used the erroneous and misleading term "labella" to indicate the mouth parts. It has been thought advisable to keep Professor Cooley's notes on *Symphoromyia pachyceras* intact, and they follow herewith over his own signature.

—FREDERICK KNAB.

We have repeatedly taken a species of *Symphoromyia* in the act of taking blood. They have always attacked me on the hand and they inflict a painful wound. The first time I was bitten by one I slapped with the same caution that I would a mosquito, lest it should escape, but I soon learned that this is unnecessary, for one can pick them up with the fingers as he would an inert object. In fact, you may poke them around with the finger without causing them to fly. They come and alight almost silently and generally come singly. Our note on this species is as follows:

NOTE 143.—Troublesome blood-sucking fly. Causing swelling. Very painful. Fly is silent when alighting.

It is my impression that this is distinctly a mountain form; that is, we do not find it in our large open valleys, but only in mountainous places.

—R. A. COOLEY.

SIX NEW GENERA OF NEARCTIC MUSCOIDEA.

BY CHARLES H. T. TOWNSEND.

The following six new genera are erected for as many described North American species, which can not be placed in any previously erected genera known to me. The reproductive habits of four of these genera are known, and these four are treated in a forthcoming paper on the female reproductive system, eggs, and early stages of muscoid flies.

Neophorocera, gen. nov.

Erected for *Phorocera edwardsii* Will. (*Euphorocera claripennis* Coq. pt.). The male has the second antennal joint hardly at all elongate, while the female had it noticeably so. The length of the second antennal joint thus becomes a secondary sexual character in this genus, which is the first case of the kind known to me in this immediate group. In the salmaciine and belvosiine flies the same secondary sexual character of the second antennal joint is much more pronounced.

Reproductive habit, oviposition of flattened macrotype egg on host. The egg-chorion is honeycomb-reticulate and without operculum. The uterus is absent, but the uterovagina of one of the dissected specimens (TD394) showed an egg containing a fairly developed maggot. This development of the maggot in the uterovagina is probably exceptional, due to undue retention of egg from failure to find a suitable host. (TD394, coll. by D H. Clemons, Aug. 22, 1908, Melrose Highlands, Massachusetts, and determined by W. R. Thompson as *Euphorocera claripennis* Coq.).

Type: *Phorocera edwardsii* Will., Scudder's Butterflies of New England, vol. III, p. 1921.

The genera *Exorista*, *Tricholyga*, *Euphorocera*, and *Chætotachina* have the egg-chorion without reticulation and furnished with an operculum at the cephalic end. *Winthemia* appears to lack both reticulation and operculum. *Chætolyga* and *Nemorilla* appear to have the chorion reticulate and without operculum, but are at once distinguished from *Neophorocera* by their ciliate hind tibiæ.

Euacemyia, gen. nov.

Erected for *Acemyia tibialis* Coq. The frontal bristles stop at base of antennæ, the vibrissæ are inserted well above oral margin, the third antennal joint of female is only about one and one-half times as long as second, the cheeks of female are only one-fifth of eye-height, the apical cell is open and ends well before wing-tip. In *Acemyia* the frontal bristles descend nearly or quite to base of third antennal joint, the vibrissæ are inserted practically on the oral margin, the third antennal joint of female is fully or more than twice as long as second, the cheeks of female are over one-

third of eye-height, and the apical cell ends almost in wing-tip. The macrochaetæ of abdomen are only marginal in both genera.

Reproductive habit unknown.

Type: Acemyia tibialis Coq., Rev. Tach., p. 116.

Acemyia acuticornis Meig. had been reared in Europe from *Acridium*. *Acemyia dentata* Coq., which is not at all typical of the genus, having the apical cell closed and ending well before wing-tip, and the eyes in female descending almost to the level of the vibrissæ, has been reared in North America from *Melanoplus* and *Chortophaga*.

Doryphorophaga, gen. nov.

Erected for *Lydella doryphoræ* Riley. It belongs with the compsilurine flies, and bears a strong general resemblance to *Compsilura concinnata*. The eyes are thickly hairy, the facialia are ciliate on about lower two-thirds, the bend of fourth vein is without stump or wrinkle, the intermediate abdominal segments bear discal bristles, and the ventral carina and curved spine-like piercer, both of ordinary character, are present in the female. It differs from *Compsilura* principally in having the second antennal joint noticeably elongate, and the parafacials widened. Differs from *Lydella* and *Dexodes* in the thickly hairy eyes, ciliate facialia, and frontal bristles not descending low; from *Incamyia* in the last character and the ordinary ventral carina; and from *Eucelatoria* in the hairy eyes and the elongate second antennal joint.

Reproductive habit, subcutaneous larviposition in host. The uterus is long, slender, and coiled, and develops white maggots in single file to the number of about 150. The maggot has well-developed rows of microscopic spines, of which the first three rows and the last row encircle the body, the intermediate six rows being on ventral surface and about half encircling the body. (TD370, coll. by D. H. Clemons, Aug. 17, 1908, Melrose Highlands, Massachusetts, and determined by W. R. Thompson as *Phorocera doryphoræ*.

Type: Lydella doryphoræ Riley, First Report, Insects of Missouri, p. 111.

The type species has been repeatedly reared from the larvæ of *Leptinotarsa* (*Doryphora*) *decemlineata* in the northern and eastern United States as far west as Missouri.

Neadmontia, gen. nov.

Erected for *Admontia limata* Coq. Whole body strongly bristly. The true frontal bristles are numerous, strong and stop at base of antennæ; a row of closely placed weak bristles runs diagonally down the parafacials below end of frontal row, but is not a true continuation of the latter. Facilia not ciliate. Arista very delicately pubescent. Third antennal joint a

little concave on upper (front) edge, the upper (front) terminal angle more or less produced into a short blunt tooth. Abdomen with discal and marginal macrochaetæ. Apical cell closed almost at wing-tip.

Reproductive habit unknown, but probably larviposition.

Type: Admontia limata Coq., Proc. U. S. Nat. Mus., vol. xxxv, p. 105.

Coquillett's interpretation of the genus *Admontia* is a complex. His *Ad. demylus* is evidently one of the compsilurine flies, as indicated by the statement in description that the abdomen of female is thickly beset with short spines on underside of third and fourth segments. It parasitizes *Cophyrus* larvæ. It is possible that his *Ad. retiniæ*, described from males only, is an *Actia*. His *Ad. polita* probably belongs to the present genus *Neadmontia*. His *Ad. pergandei* and *degeerioides* seem to fit the genus *Admontia*. His *Ad. setigera* (San Mateo County, California, specimen) is a different genus from all of these. It lacks discal abdominal bristles, and bears on parafacials a true continuation of frontal bristles in a row extending to lower border of eye, all the frontal and parafacial bristles being of equal strength at root. This California specimen is a female and shows no ventral carina.

Specimens determined by J. A. Hyslop as *Admontia pergandei* Coq. were reared by him from larvæ of *Tipula infuscata*, Jackson, Tennessee. Nineteen flies issued from October 7 to 14, 1908. A reared female was found by Hyslop to contain 103 elongate eggs. The genus is recorded as parasitic in larvæ of Tipulidæ in Europe. The female probably deposits maggots on the surface of the soil, and these penetrate later in search of the tipulid larvæ.

TD389, collected by D. H. Clemons, August 21, 1908, North Saugus, Massachusetts, and determined by W. R. Thompson as *Admontia degeerioides* Coq., showed a slender uterus containing about 55 eggs and maggots similar to those of the compsilurine flies in general appearance. Female without piercer, with discal abdominal bristles, ciliate facialia, long, slender third antennal joint, and apical cell ending near wing-tip.

Oxexorista, gen. nov.

Erected for *Exorista eudryæ* Towns. This has the general external characters of *Sisyropa*. But until the female of *Tachina thermophila* Wied. of Java (type of *Sisyropa*) is dissected, we shall not be able to say what the genus *Sisyropa* is. *Eumasicera coccidella* Towns. has apparently the same general external characters as *T. thermophila* Wd., and the female fly is almost indistinguishable externally from the female of *Sisyropa hemerocampæ* Towns. Yet the last (TD387, Gip. Moth Lab. 1976) deposits

elongate white maggots on or near host, while the first (TD388, Gip. Moth Lab. 1975) deposits black microtype eggs on foliage. Thus *Sisyropa* may have either one of these habits, or perhaps still a different one. *Sisyropa hemerocampæ* Towns. (syn. of *Exorista amplexa* Coq., acc. W. R. Thompson) probably does not belong to the present genus. Its egg shows no sign of pedicel, while the dissected eggs of *Exorista eudryæ* (TD395) showed an atrophied pedicel. It is most probable that *Sisyropa hemerocampæ* Towns. is congeneric with *T. thermophila* Wd., since both have the front very narrow, the cheeks and especially parafacials extremely narrow, and the eyes thickly hairy.

Reproductive habit, larviposition of white maggots on or near host. The maggot is fat, with 13 wide and complete rows of microscopic spines encircling the body, the spines somewhat weaker dorsally. The spermathecal ducts are elongate and doubled on themselves. Uterine capacity up to 200 or 300 eggs and maggots. (TD395, collected by D. H. Clemons, Aug. 22, 1908, Melrose Highlands, Massachusetts, and TD425, collected by F. B. Lowe, August 29, 1908, near Swampscott, Massachusetts; both determined by W. R. Thompson as *Exorista eudryæ* Towns.

Type: Exorista eudryæ Towns., Trans. Am. Ent. Soc., vol. XIX, pp. 287–288.

Euexorista, gen. nov.

Erected for *Exorista futilis* O. S. This has the general external characters of *Parexorista*, and was referred to that genus by B. and B.. along with the host of other species of various reproductive habits. Thus B. and B's *Parexorista* is another mixed-reproduction genus. The present form has no discal bristles on intermediate abdominal segments, and the hind tibiæ are ciliate.

Reproductive habit, leaf-oviposition of black microtype eggs. Uterine capacity up to 2,000 or 3,000. Chorion with a low power shows a beaded net-like design, the bead strings running from pole to pole and more or less interlaced into a network; with high power (oil immersion) it shows a structure composed of a microscopic network of chitin, the lines of chitin being much narrower than the open spaces between them. (TD361, August 15, 1908, Spot Pond, near Melrose, Massachusetts, and TD344 August 13, 1908, North Andover, Massachusetts; both collected by D. H. Clemons, and determined by W. R. Thompson as *Exorista futilis* O. S.)

Type: Tachina (*Exorista*) *futilis* Osten-Sacken, Can. Ent., vol. XIX, p. 161.

It appears from the descriptions that this species can not belong to *Epimasicera*, type *Tachina westermanni* Zett. (syn. of *Tachina mitis* Meig., acc. Thomson, Bezzi and Stein), since this genus has two pairs of median discal macrochaetæ each on second and third abdominal segments and the hind tibiæ are not ciliate.

THREE NEW NOCTUIDÆ.

BY HARRISON G. DYAR.

Arenostola orphnina, new species.

Gray, over soiled ocherous, generally evenly suffused with gray, nearly obliterating the markings. In specimens with little suffusion all the veins are dark-lined and a row of dark points on the veins represents the outer line; a small white speck at the origin of vein 3; a row of terminal black dots between the veins; a gray shade along costa and from median vein outward, these shades darker than the rest of the wing also in suffused specimens. Hind wing pale gray. Expanse, 27 to 32 mm.

Four males, three females, Hampton, New Hampshire, August 1, 1911 (S. A. Shaw).

Type: No. 15098, U. S. National Museum.

A robust species like *inquinata* Guenée, but still larger and longer-winged. The veins are dark-lined as in *defecta* Grote.

Paracretonia, new genus.

Falls in the Erastriinæ. Fore wing with vein 9 from 10 anastomosing with 8 to form the areole; frons with rounded prominence, roughened, with a plate below; fore tibiæ unarmed; abdomen without crests; hind wing with vein 5 well-developed from well below middle of discocellulars; eyes large, round; palpi upturned.

Paracretonia xithon, new species.

Fore wing light gray, with an almost whitish ground, shaded with blackish gray; a broad dark oblique inner band from costa to claviform; an ocherous elongate mark below; spots white-filled, orbicular round with black dot and ring, reniform constricted, with black spot in lower half, claviform rather large; an oblique white shade before apex; outer line oblique, double, blackish, followed by an ocherous band in which gray rays project along the veins; a marginal row of dark dots. Hind wing fuscous with white fringe. Expanse 21-22 mm.

Three specimens, La Puerta Valley (near San Diego), California (G. H. Field).

Type: No. 15112, U. S. National Museum.

This may prove to be the same as *Phyllophila aleptivoides* Barnes and McDunnough (Can. Ent., XLIV, 217, 1912).

Sacadodes, new genus

Antennæ bipectinate, the branches moderate in the male, short in the female, ciliate. Palpi porrect or oblique, the second joint long, thick; third short, nearly globose in the male, long and slender in the female.

Tongue undeveloped. Eyes large, naked. Front with roughened tubercular prominence, angular in outline. Tibiæ rather densely hairy, without spines. Thoracic vestiture hairy, prothorax slightly crested, metathorax with thick divided crest; abdomen with small crest at base. Fore wing with vein 9 from 10, anastomosing with 8 to form the areole; 7 from near end of areole. Hind wing with vein 5 strong, from well below middle of discocellulars. Retinaculum of male broad, not bar-shaped.

Said to be near *Diparopsis* Hampson, which has vein 5 of the hind wing weak and arising near middle of discocellulars, according to Hampson's description and figure. In the present form vein 5 seems scarcely at all weaker than the other veins.

Sacadodes pyralis, new species.

Fore wing clayey ocherous to purplish brown; basal and subterminal spaces darker, olivaceous brown; a narrow dark discal mark; lines lighter, the inner edging the basal dark area, angled below median vein; outer slightly curved, with a narrow dark inner edging; subterminal line straight, near and similar to the outer line. Hind wing whitish in the male, purplish brown in the female. Expanse, 30 mm.

Two males, one female, Trinidad, British West Indies, bred from the "pink cotton-boll worm" (P. L. Guppy).

Type: No. 15113, U. S. National Museum.

Both in markings and structure much like *Diparopsis castanea* Hampson, which is destructive to cotton in South Africa.

The larva is cylindrical, robust, the segmental incisures strong. Head moderate, its vertex within joint 2. Cervical shield and anal plate well chitinized. Skin smooth; tubercles and setæ small, normal. Abdominal legs equally developed. The mature alcoholic specimen is colorless; a smaller one is marked with pink in dorsal and stigmatal bands, row of oblique subdorsal dashes and narrow subventral line.

Mr. Schaus kindly examined a specimen and consulted with Mr. Paul Dognin and Sir G. F. Hampson. Mr. Dognin has specimens of the species from Argentina and the one that Mr. Schaus examined was from Venezuela. The distribution of the species is therefore extensive.

The new name was communicated to me by Mr. Schaus, having been suggested, I understand, by Sir G. F. Hampson.

MORE ABOUT THE SLOTH MOTH.

(Lepidoptera, Pyralidæ.)

By Harrison G. Dyar.

Some time ago I described a pyralid from the fur of the living sloth as *Cryptoses cholœpi* (Proc. Ent. Soc. Wash., IX, 142, and X, 81, 1908). At the time I overlooked the description of a sloth moth by Spuler as *Brachypodicola hahneli*. The English entomologists have concluded that these two forms were the same species and I have lately received specimens of my species positively labeled with the name of Spuler's. However, I am now satisfied that there are at least three sloth moths, each referable to a distinct, though allied, genus.

Of *Cryptoses cholœpi* I have now 30 specimens, 19 males and 11 females, received through the kindness of Mr. William Schaus from different parts of Costa Rica. The sexes differ in venation, in wing shape, and in the distinctness of the markings. The figure of the venation given by me (Proc. Ent. Soc. Wash., IX, fig. 9) is that of the female. The male differs in lacking entirely vein 11, there being only one free vein and three stalked veins from the upper angle of the cell. The wings of the male are more sharply pointed than those of the female. The markings which I described (Proc. Ent. Soc. Wash., X, 81) are those of the male. Those of the female are duller, the pale streaks less contrasted. The moths vary considerably in size in both sexes. The three original types are all females.

Of *Bradypodicola hahneli* I have not obtained any material. A study of Spuler's article, however, shows its distinctness from the above. Spuler figures the venation of the male. In it vein 2 is shown stalked with 3–5, while in *Cryptoses* it arises well before the angle of the cell; vein 6 also in *Bradypodicola* arises further below the angle of the cell than in *Cryptoses*. But these are minor differences, while in general the venation is alike. However, the shape of the head is very different. In *Bradypodicola* it is very prominent at the vertex in side view, the front being concave. In *Cryptoses* the vertex is very slightly prominent and the front continuously convex.

The occurrence of a third form strengthens the above conclusion of the distinctness of *Bradypodicola* and *Cryptoses*. This third form is from Brazil, and I have before me a female specimen sent by Dr. R. von Ihering. Doctor von Ihering will name and describe it, so I will not enter into its discussion at present, otherwise than to say that it differs from both the

above in venation, while the shape of the head is more like *Bradypodicola* than *Cryptoses*.

Crpytoses cholœpi comes from Central America and Panama, where it lives in the fur of the sloth *Cholœpus*. *Bradypodicola hahneli* comes from Brazil, where it lives in the fur of the sloth *Bradypus*. Of the habits and distribution of the third species we shall be enlightened later by Dr. von Ihering.

NEW SPECIES OF NOCTUIDÆ FROM FRENCH GUIANA.

By W. Schaus.

Obroatis reniplaga, new species.

Male.—Palpi, head, and collar dark olive brown; thorax fuscous brown, with some lilacine irrorations. Abdomen dark gray brown. Fore wings to outer line fuscous, heavily irrorated with lilacine white; costa finely olive brown; antemedial line vertical, lilacine on costa, then ocherous brown, outwardly expanding on median and submedian into dark points; orbicular minute, dark brown; reniform large, irregular, dark velvety brown, becoming narrower and paler brown anteriorly, finely edged behind with lilacine; a fuscous shade on costa above reniform, and faint darker shade below it from vein 2 to inner margin; outer line fine, deeply lunular, punctiform on veins, and outcurved below costa, followed by a broad pale yellowish-brown shade; subterminal shade broad, sinuous, fuscous, partly crossed by an indistinct whitish line; outer margin pale brown, with a terminal fuscous line, and white points on veins. Hind wings fuscous to outer line, which is very faint, but with distinct dark brown points on veins; the space beyond and termen as on fore wings. Wings below grayish brown; darker spots on discocellular; the outer line deeply lumular, fine, distinct, but without points; indistinct small subterminal spots on interspaces.

Expanse, 50 mm.

Other specimens are smaller, 39 mm, and paler.

Habitat: St. Jean, Maroni River.

Near *O. distincta* Butl.

Obroatis roseipalpis, new species.

Male.—Palpi bright red, fringed with rosy brown. Head rosy brown, collar olive brown. Thorax, abdomen, and wings ocherous brown; a postmedial straight, broad, purple line, divided by a fine lilacine shade, and closely followed by a fine dentate lunular line, punctiform on veins; subterminal dark streaks marked by yellowish points on interspaces; cilia dark brown crossed at base by a fine pale line, on hind wings tipped with roseate. Fore wings: Costa finely roseate; an almost imperceptible antemedial line; orbicular a minute brown point; reniform constricted medially, yellowish brown, darkly outlined but not distinct. Hind wings: The postmedial terminating

on inner margin near angle. Wings below yellowish tinged with reddish brown, chiefly on fore wings; the spots minute; the postmedial line dark, indistinct, more remotely followed by the dentate lunular line; some fuscous subterminal spots on fore wings.

Expanse, 38 mm.

Habitat: St. Jean, Maroni River, Cayenne.

Obroatis cratinus, new species.

Male.—Palpi gray, shaded with red at base and above. Head, collar and thorax fawn color. Abdomen dorsally shaded with fuscous gray. Legs clothed with vermilion-brown hairs; tarsi gray, spotted with white. Wings light reddish brown. Fore wings: An antemedial fine gray line, angled on subcostal; orbicular a minute yellow point; reniform large, round, black-brown, broadly edged with ocherous gray; postmedial line fuscous brown, outcurved from costa, inbent, touching reniform, terminating at middle of inner margin; a fine dark outer line, deeply lunular, and punctiform on veins, followed by lilacine white irrorations, which extend to apex; subterminal pale spots on interspaces. Hind wings similar, but without antemedial markings; an indistinct fuscous line on discocellular. Wings below rose vermilion, thinly irrorated with black; spots minute, black; outer lunular line fine black, the points on veins distinct.

Expanse, 47 mm.

Habitat: St. Jean, Maroni River.

Athyrma antica, new species.

Female.—Palpi outwardly olive brown, inwardly grayish buff. Head, collar, and thorax grayish brown, tinged and irrorated with lilacine white. Abdomen and hind wings grayish brown. Fore wings gray, tinged with pale reddish brown antemedially and postmedially, the costal margin for two-thirds, and cell medially tinged with lilacine; a subbasal velvety brown line on costa, inbent from subcostal to base; a large velvety black antemedial spot, somewhat triangular with its apex projecting across cell and connected with a darker gray shade on costa, its inner edge oblique from within cell to below submedian, its outer edge outwardly oblique, but less so than inner edge, its posterior edge sinuous, and finely outlined with white except on medial side; a faint postmedial pale reddish brown line, partly finely marked with black scales, oblique, indistinct on costa, vertical, dark-spotted from veins 8 to 6, sharply in and up curved, down bent on discocellular, sinuous to submedian near dark antemedial space, and more heavily marked across this vein; the outer edge of brownish postmedial space oblique from costa near apex to inner margin, somewhat dentate; a terminal dark lunular line.

Expanse, 40 mm.

Habitat: St. Laurent, Maroni River.
Near *A. tuberosa* Feld.

Argidia rufa, new species.

Male.—Palpi, body, and wings above brown-red; abdomen terminally fuscous brown. Wings: A darker straight postmedial line, finely edged outwardly with dull lilacine and some metallic blue scales; faint traces of a darker subterminal shade; darker streaks on discocellular. Fore wings: Basal half of costa finely fuscous, with a few lilacine irrorations below it; a minute darker point in cell; traces of a darker antemedial line. Thorax below black; tibiæ partly fringed with brown; tarsi light brown; abdomen below buff. Wings below fuscous brown; the apex of fore wings broadly lighter brown.

Expanse, 45 mm.

Habitat: St. Laurent, Maroni River.

Argidia suprema, new species.

Female.—Palpi, frons, and legs dark red; tarsi dark gray. Vertex, collar, and thorax dull lilacine gray. Abdomen darker, brownish, shaded with fuscous terminally. Fore wings for two-thirds lilacine gray; a fine darker antemedial line; orbicular large, round, yellowish, finely circled with brown; a fine darker medial line slightly inbent from middle of cell; reniform indistinct, long and narrow, finely darker edged and crossed by a darker gray shade; a postmedial whitish line from vein 3 to inner margin; outer third dark olive brown, almost black beyond reniform, its inner edge slightly incurved on costa; costa at apex finely buff; some terminal whitish irrorations; faint traces of a subterminal fuscous shade. Hind wings lilacine gray at base; a fine antemedial line; medial space broadly fuscous brown mottled with lilacine sealcs; terminal space dark silky brown; traces of subterminal fuscous shade; terminal lilacine irrorations except at apex. Wings dark below reddish brown; a fuscous straight medial line. Fore wings: A yellow spot at base; orbicular not quite round, bright yellow; reniform large, constricted medially, bright yellow with two small reddish brown spots; the costal margin above it bright yellow, extending broadly towards apex; outer line fine, indistinct; termen broadly shaded with fuscous gray; a subterminal whitish line towards apex; cilia at apex white. Hind wings: A distinct fuscous postmedial line outwardly finely edged with lilacine.

Expanse, 44 mm.

Habitat: St. Laurent, Maroni River.

Oroscopa noctifera, new species.

Female.—Palpi brown, darker mottled above, fringed below with white. Head brown, collar, thorax, and base of abdomen narrowly, pale buff; a velvety brown black line on collar anteriorly. Abdomen buff gray, darkly irrorated and with dorsal dark spots. Fore wings pale buff; costa narrowly whitish buff; a pale brown subbasal dash on costa, followed by a similar

fine dentate and interrupted line, deeply outcurved and barely traceable; a short dash in place of orbicular; reniform irregular, pale brown, preceded by a white point and brown shade, followed by a white streak to postmedial; a medial brown dash below cell; postmedial fine, geminate, dark brown, deeply outcurved beyond cell, and inbent to before middle of inner margin; a dark shade below white streak and postmedial; postmedial followed on costa by a small brown spot and a long, thick black streak to near apex; fine fuscous streaks on veins 6 and 7, and a shorter marginal streak between them; outer space from near vein 6 to inner margin fuscous brown, crossed by an outer sinuous fuscous line, between which and the postmedial there is a buff shade on inner margin. Hind wings: Base narrowly pale buff, otherwise dull brown irrorated with fuscous: A deeply dentate medial fuscous line: the termen broadly fuscous except from vein 6 to above 7, with intervenal brownish streaks. Fore wings below buff shaded with pale brown, base narrowly; a curved brown line crossing discocellular expanding below cell; the postmedial interrupted, less inbent; the dark terminal space narrower, blacker. Hind wings below buff, shaded with pale brown; a broad fuscous antemedial shade, not reaching inner margin; a postmedial brown shade mottled with fuscous from vein 5 to near inner margin; the termen mottled with fuscous from vein 5 to anal angle.

Expanse, 32 mm.

Habitat: Cayenne.

Focilla gregalis, new species.

Female.—Palpi fuscous irrorated with white. Head, and body above brown; some white scaling on vertex; segmental fuscous lines on abdomen. Fore wings brown, tinged with olive gray; an irregular fuscous subbasal line; antemedial fine, lunular, fuscous brown, deeply inbent in cell, preceded by a white point on costa; a black point as orbicular; a wavy reddish brown medial line, followed by a similar shade; reniform indistinct, incurved, fuscous gray, edged with olive gray; postmedial fine, velvety black, wavy, outcurved beyond cell, followed by an irregular reddish-brown shade, subterminal fuscous shadings, forming spots towards apex; a lunular marginal black line connecting intervenal spots, outwardly shaded with lilacine white. Hind wings: a black streak on discocellular; a broad dark reddish-brown shade, followed by the fine wavy black postmedial line, which crosses a faint lilacine shade; subterminal lunular, dentate, fuscous, indistinctly geminate; the marginal dark points distinct, the line connecting them less so. Wings angled at vein 4. Underneath light yellow brown with some darker irrorations; the lines black, very distinct on hind wings, wavy; the subterminal distinctly geminate, interrupted by veins on hind wings.

Expanse, 36 mm.

Habitat: St. Jean, Maroni River.

Focilla furva, new species.

Female.—Body and wings dark brown, lines fuscous; tarsi yellowish; white points at joints of tibiæ. Fore wings: A subbasal light brown line, lunular, inbent to base of submedian; antemedial fine, wavy, crossing a broad lighter-brown space, outwardly edged by the wavy medial line; reniform dark grayish with a pale reddish-brown spot behind, partly outlined with fuscous scales; postmedial outcurved, wavy, from a pale streak on costa above reniform, inbent at vein 3 to before reniform, and wavily outbent to inner margin; an indistinct subterminal sinuous brown line, partly shaded with fuscous, and not reaching costa; marginal grayish spots between veins; the termen crenulate, prolonged at vein 4 to beyond apex. Hind wings: A dark reddish-brown shade from postmedial to subterminal; the marginal spots as on fore wings; the termen prolonged at veins 6 and 4. Wings below lighter brown irrorated with lilacine white; orbiculate and lunate discocellular spots black; a fine white outer line, and small marginal intervenal spots.

Expanse, 39 mm.

Habitat: St. Laurent, Maroni River; in the British Museum, from Costa Rica.

Focilla gorge, new species.

Male.—Body above purplish gray, underneath creamy buff. Wings above light brown shaded with purple except on termen, the two separated by a broad subterminal fuscous brown shade; marginal black points between the veins; a wavy medial fuscous line. Fore wings: A dark brown subbasal line; a lunular antemedial line, inbent in cell; postmedial finer, angled on costa, approximate to medial line from cell and lunular to inner margin; reniform vaguely indicated, light brown. Hind wings: A fine dark brown postmedial line, very irregular. Wings below light buff brown, the lines very fine, fuscous brown; black points on discocellular; medial line slightly outcurved; a fine subterminal line; marginal intervenal black points. Fore wings; a black antemedial point in cell; postmedial curved on costa and vertical to inner margin. Hind wings: The subterminal vaguely geminate; the postmedial slightly wavy.

Expanse, 36 mm.

Habitat: St. Jean, Maroni River.

TRYPHONINÆ—A REVIEW.

BY HENRY LORENZ VIERECK.

Mr. Claude Morley has favored the entomological world with another volume of his Ichneumonologia Britannica, being volume IV of his British Ichneumons, Tryphoninæ, and set forth in text and figures comprising pages i–xvi, 1–344, one plate, and many figures.

This compilation will no doubt be consulted by many a student of insects and not vainly, for a mass of facts has been painstakingly gathered and arranged, while some genera have been figured that have previously been known to science only by descriptions.

In view of the circulation that the present book is likely to have, it is the more unfortunate that the author did not lay down his work more securely, as, for example, with reference to the genera there is an evident disregard as to foundation stones.

Forty-nine genera are treated, of which one is a new genus, and a blanket genus at that, including a number of old genera that by some writers have been regarded as good and distinct. The new genus is *Homocidus* and is evidently a mixture of many species belonging to *Zootrephes*, *Syphoctonus*, and *Homotropus*, and possibly *Enizemum* and *Aniarophron*. If these genera are to be fused then *Zootrephes* must be used and a new genus is uncalled for. For the present *Homocidus* Morley, for which I designate *Homocidus elegans* Gravenhorst as type, sinks as a synonym of *Homotropus* (Foerster) Davis, for which latter I designate *Bassus bicapillaris* Walsh as type. In the table of genera *Homocidus* is represented as wanting notauli, but in the table to species under the same genus are to be found two categories, one with notauli present, the other with notauli wanting!

Bassus is credited to Fallén instead of Fabricius, who erected the genus. According to Curtis's fixations of types *Bassus* Fabricius can not be used for *Bassus* Authors, which latter should be called *Anomalon* Jurine. *Anomalon* Authors being without a name may be called *Paranomalon* new genus, with *Ophion flavifrons* Gravenhorst as type.

The type of *Acrotomus* Holmgren has never been fixed, so *Tryphon lucidulus* Gravenhorst is hereby designated as type.

Adelognathus Holmgren: No type designated. Type *Adelognathus brevicornis* Holmgren, by present designation.

Catoglyptus Holmgren: No type designated. Type *Mesoleptus fortipes* Gravenhorst, by present designation.

Chorinæus Holmgren: No type designated. Type *Exochus funebris* Gravenhorst, by present designation.

Ctenopelma Holmgren: No type designated. Type *Ctenopelma nigrum* Holmgren, by present designation.

Diaborus (Foerster) Woldstedt: No type designated. Type *Cteniscus* (*Diaborus*) *sedulus* Woldstedt, by present designation.

Eclytus Holmgren: No type designated. Type *Eclytus ornatus* Holmgren by present designation.

Erromenus Holmgren: No type designated. Type *Erromenus brunnicaus* Gravenhorst, by present designation.

Euryproctus Holmgren: No type designated. Type *Mesoleptus annulatus* Gravenhorst, by present designation.

Exenterus Hartig 1838 appears to be the same as *Cteniscus* Haliday 1837.

Exochus Gravenhorst: Type designated by Westwood not originally included. Type *Ichneumon gravipes* Gravenhorst by present designation.

Grypocentrus Ruthe: No type designated. Type *Grypocentrus incisulus* Ruthe, by present designation.

Labrossyta (Foerster) Davis: No type designated. Type *Grypocentrus bimaculatus* Ashmead, by present designation.

Lathrolestes (Foerster) Davis: No type designated. Type *Lathrolestes nasoni* Davis, by present designation.

Mesoleius Holmgren: No type designated. Type *Tryphon aulicus* Gravenhorst, by present designation.

Mesoleptus Gravenhorst: As restricted by Curtis's fixation of type in 1837 this genus in synonymous with *Exolytus* Holmgren, which it replaces. *Mesoleptus* Authors not Gravenhorst is left without a name and may be called *Mesoleptidea* new genus. Type *Mesoleptus cingulatus* Gravenhorst.

Metopius Panzer: No type designated. Type *Sphex vespoides* Scopoli, by present designation.

Notopygus Holmgren: No type designated. Type *Notopygus emarginatus* Holmgren, by present designation.

Perilissus Holmgren: No type designated. Type *Mesoleptus limitaris* Gravenhorst, by present designation.

Perispudus Thomson = *Perispuda* (Foerster) Kriechbaumer: *Perispuda* (Foerster) Kriechbaumer had priority and is isogenotypic with *Perispudus* Thomson.

Picrostigeus Thomson = *Piscrostigeus* (Foerster) Thomson: No type designated. Type *Orthocentrus* (*Picrostigeus*) *setiger* Thomson, by present designation.

Polyblastus Hartig: No type designated. Type *Tryphon varitarsus* Gravenhorst, by present designation.

Polyclistus (Foerster) Thomson = *Hypsicera* Latreille: No type designated. Type *Ichneumon femoralis* Fourcroy, by present designation.

Promethus Thomson: No type designated. Type (*Bassus*) *Promethus sulcator* Gravenhorst, by present designation. This genus is synonymous and isogenotypic with *Promethes* (Foerster) Woldstedt, which has priority.

Mr. Morley includes *Liopsis* Foerster as a synonym of *Promethus* Thomson and is thus the first person to include species under this genus. I select *Promethus sulcator* (Gravenhorst) as type, *Liopsis* (Foerster) Morley thus becoming isogenotypic with *Promethes* (Foerster) Woldstedt.

Smicroplectrus Thomson: No type designated. Type (*Exenterus*) *Smicroplectrus jucundus* (Holmgren), by present designation.

Stenomacrus (Foerster) Thomson: No type designated. Type *Orthocentrus silvaticus* Holmgren, by present designation.

Trematopygus Holmgren: No type designated. Type *Trematopygus ruficornis* Holmgren, by present designation.

Trichomastix Vollenhoven = *Bioblapsis* (Foerster) Dalla Torre: The latter genus has priority.

Zootrephes Thomson: No type designated. Type *Bassus holmgreni* Bridgman, by present designation, which Morley holds to be the same as (*Bassus*) *Zootrephus rufiventris* Gravenhorst. *Zootrephus* Thomson must be replaced by *Zootrephes* (Foerster) Woldstedt, the genotype of which latter is regarded as congeneric with the genotype of *Zootrephus* Thomson.

Fortunately, the fact that Mr. Morley did not concern himself with the foundation stone or genotype of each genus used by him does not change the status of his concepts in many cases, as quite frequently the constituents of his generic concepts include the genotype of the genus involved. However, in such a painstaking effort as this, one would look for the finality that can come only through the consideration of genotypes, especially in view of the fact that some of the earliest writers from Latreille on recognized the necessity of definite premises upon which to argue the case of the ichneumon flies.

The compilation of biological records is apparently exhaustive and will serve a useful purpose in the hands of the field worker and economist.

The classification of the Tryphoninæ as here set forth is admittedly no improvement over Holmgren's system, except in the acceptance of an additional tribe based on pectination of claws.

Segregates of some of the older, heterogeneous genera, accepted by colleagues of the author, are suppressed, as in the

case of the Bassini, while the conformation of the scape in one case and the character of the claws in another is drawn upon to separate tribes. So we have the time honored inconsistency of treatment repeated.

While we could have wished to have the subject treated from some new viewpoint, yet the result will be of value to all students of this group, no matter what fauna is considered, especially in view of the treatment of a number of species that are genotypes of widely distributed genera and the introduction of so many good figures which act as a guide to the habitus in a group where habitus is so important in introducing the uninitiated to the study of the group.

NOTES ON NEARCTIC MANTISPIDÆ.

By Nathan Banks.

Our species of this family are not numerous; on the occasion of adding two more I tabulate the genera that are now known to be represented in the United States. The genus *Trichoscelia* occurs in Mexico, and so may be taken later on our side of the border.

1. Two claws to tarsus I; axillary vein forked in margin; pronotum short, bristly; female with long ovipositor.... *Symphrasis*
   But one claw to tarsus I, axillary vein not forked; pronotum more elongate; no ovipositor.......................... 2
2. Pronotum without transverse furrows or corrugations, finely haired; first radial cell with but one branch....... *Mantispilla*
   Pronotum transversely furrowed, not hairy, usually more than one branch from first radial cell 3
3. Upper branch of first radial sector bent up to unite with second radial sector, or connected thereto by very short cross-vein; radial cells very slender.................... *Climaciella*
   Upper branch of first radial sector connected to second radial sector by a rather long cross-vein; radial cells broader; pronotum more elongate........................ *Mantispa*

Symphrasis includes but one species, *S. signata* Hagen, from the Southwest.

Climaciella was made by Enderlein for our *Mantispa brunnea* Say; it will also include *M. floridana* Bks.

Mantispa includes several species, one of which, *M. mæsta* Hag., has never been refound.

Mantispilla was considered a subgenus by Enderlein; as defined above it makes a good genus; we have two species hitherto undescribed.

Mantispilla scabrosa, new species.

Pale; a broad median brown stripe on face down over labrum, a narrow brown stripe each side between antennæ and the eye; antennæ mostly pale, but with dark tip, before which it is paler than elsewhere; vertex with a few dark spots; pronotum pale, quite long, broad in front, but tapering evenly behind, clothed above with many short, stiff black bristles; thorax darker on sides above, the lobes with black bristles; pleura dark, with faint yellow streaks; legs pale, femur I reddish brown, blackish within; abdomen dark, unmarked. Wings hyaline, subcostal area and stigma reddish brown, a faint dark cloud under stigma on the cross-vein; venation blackish; first radial cell with one branch, second with two or three, third with two, second cell much narrowed at tip; cells beyond stigma higher than long; cross-vein between first and second radial sectors as long as width of costal area.

Expanse, 28 mm.

From Mesilla, New Mexico (Morse).

Mantispilla pulchella, new species.

Pale; a narrow median brown stripe on the face, forked at base of antennæ, basal joint of antennæ pale, beyond dark brown; pronotum long, brown on each side, above with scattered fine, short, pale hairs, likewise some on the lobes of mesonotum, thorax pale yellowish, marked with dark brown on pleura and in front, legs pale, front femora, except base, reddish brown, darker within, middle and hind femora with dark line beneath on basal part. Abdomen pale, darker on venter, above with some dark spots. Wings hyaline, subcostal area and stigma pale yellowish, veins black, except median and radius, which are pale; radial cells broad, each with but one branch in the fore-wings; in hind wings with one branch from first radial cell, two from second cell, none from third; cells beyond end of stigma longer than high.

Expanse, 20 mm.

From Eureka, Utah, July 22 (Spalding)

BLOOD-SUCKING INSECTS AS CARRIERS OF HUMAN DISEASES.

By C. T. Brues,
Bussey Institution, Harvard University.

I have been much interested in the summary published in the last number of the Proceedings of the Entomological Society of Washington (vol. XIV, pp. 79-81, April-June, 1912), of remarks by Dr. Frederick Knab relative to the transmission of human diseases by blood-sucking insects.

He has called attention to the fact that such insects must be rather constant companions of man in order that their potential powers to act as vectors may be utilized. On this account it is stated that such insects as Simuliidæ, Tabanidæ, and sylvan mosquitoes may be eliminated, as they do not feed regularly on human blood, and are active during only a limited season, a condition that would necessitate too great an interval during which no transmission could occur. In addition, it is stated that with insects which do not normally bite man, the chances of such species obtaining parasitic microorganisms from an infected person and then inoculating a second person are too remote to allow for the perpetuation of the disease.

These statements hold good for such diseases as yellow fever and malarial fevers so far as we know, since the pathogenic organisms are confined to man and specific mosquitoes in which they undergo a definite life-cycle.

Two matters have been overlooked, however, which have a very important bearing on certain other insect-borne diseases. In the first place, there is the possibility that some human diseases may be common to animals. This has been demonstrated in the case of some infections, and in at least one insect-borne disease is known to occur. Thus, with African sleeping sickness, wild antelopes and domestic cattle may act as reservoirs for the trypanosomes that produce the disease and tsetse flies infected from them may spread the disease in man. That many more animal diseases may bear some such relation to man is probable, although present information relates mainly to infections (e. g., anthrax) which are not ordinarily insect-borne.

Secondly, the occurrence of chronic carriers must not be overlooked. Such conditions are best known in certain diseases such as typhoid fever and diptheria, where blood-sucking insects do not ordinarily spread the infection; but the piroplasma of tick-borne splenetic fever (Texas fever) of cattle is known to persist in chronic cases. That such is commonly true of some human insect-borne diseases is by no means un-

likely, and although it could hardly account for the persistence of a human disease carried exclusively by a specific insect vector, it renders possible the transfer of diseases by a contaminative carrier during certain short periods alternating with longer periods of inactivity.

NOTE ON THE AVOCADO WEEVIL (HEILIPUS LAURI BOHEMAN).

By Herbert S. Barber,
Bureau of Entomology, U. S. Dept. of Agriculture.

Last month (March 1912) some aguacate seeds (avocado or alligator pear) were planted for germination in one of the greenhouses of the Department of Agriculture in Washington, and while inspecting importations against noxious insects, Mr. E. R. Sasscer had his attention drawn to one of these seeds showing injury which, when the seed was opened, proved to be the result of a large weevil larva therein contained. Unfortunately the seed lay for a time on his desk subject to the attack of the ant-pest (*Solenopsis debilis*) from which the Bureau of Entomology suffers, before he brought it to me. When examined further the seed was found to contain, in addition to the half-devoured larva, two fine pupæ, each in a thin-walled cell of excrementous material, the three together almost completely filling the space formerly occupied by the two great cotyledons.

In the same greenhouse and at about the same time (March 19, 1912) an attendant had picked up and handed to Mr. Sasscer a large weevil that was feeding on the leaves and stem of a seedling aguacate and which had undoubtedly issued from another seed of the same lot. A few days later some one in passing through the greenhouse picked up another adult weevil for a friend interested in insects, who, in turn, brought it to me for determination.

The species was described by Boheman in 1845 (Schönherr, Gen. et sp. Curc. vol. 8, pt. 2, p. 443) under the name *Heilipus lauri*, stating that it was found in the fruit of *Laurus drymifolia*.[1]

In the Biologia Centrali-Americana Champion mentions two specimens of this weevil from Capulalpam, Mexico, in

[1]Having been much confused by the different names assigned to the Aguacate and thinking several species might be involved, it may be well to explain that this name is now considered a synonym of what Small calls *Persea persea* (L.) Ckll. and equals, as far as I can learn, *Laurus persea* Linn., *Persea gratissima* Gaertn., and *Persea americana* Mill., but is a distinct species from the recently described *Persea pittieri* Mez.

the Sallé collection. Two other specimens are in the U. S. National Museum collection, one of which was found on an aguacate at Ontario, California, November 22, 1911, by Mr. S. A. Pease, while the other was found in an aguacate seed in St. Louis, Missouri, by Mr. Clay E. Jordan.

Subsequent to the presentation of this note, further observations were made which would best be added.

On May 2, the greenhouse attendant found another adult in a spider web near a pot containing several avocado seeds and noticed an apparently fresh exit hole over one of them. I visited the greenhouse the following morning and tried to trace up all receipts of *Persea* seeds from which weevils might have issued. It seems only one lot was infested. This was received from a dealer in San Jose, Costa Rica, December 26, 1911, consisting of 26 seeds of *Persea pittieri*, which were then noted as being in poor condition. Five of these seeds had germinated and grown to plants from a foot to a foot and a half in height, and from the cotyledons of three of these plants weevils had issued, leaving a still very obvious exit hole in the soil close to the plant stem. These three plants were taken up and the cotyledons showed the same injury that had appeared from the other seeds, but, of course, this injury had not affected the germ. On May 23, four additional plants that had been grown at Miami, Florida, from seeds of the same lot were examined and the cotyledons showed no exit holes.

A plant grown in the local greenhouse which when examined three weeks earlier had shown no sign of infestation, now had an apparently fresh exit hole in the soil about an inch from the stem, which led down into the pupal chamber in the cotyledon. This plant seemed less robust in its growth than the others. Another adult, dismembered by ants, was found on a ledge in the greenhouse, but may have been there for weeks.

A specimen of this weevil was taken early in July at Whittier, California, in a grove of avocados about 2 years old, in the nursery of Mr. Rideout. Mr. P. H. Dorset, of the Bureau of Plant Industry, who found the weevil, believes it came from Mexican seed, but states that no seed had been planted in that part of the nursery for nearly a year.

Seven adults, two pupæ, and a larva of this species are now in the National collection. Of the adults the four that issued in the Washington greenhouse from the seed of *Persea pittieri* from Costa Rica are of a decided red ground-color, with red femora, and lack the two transverse white fascia of the elytra, while the other three are dark brown, have unicolorous legs, and display the prominent patches of white scales mentioned and figured in the Biologia Centrali-Americana.

Coupled with the different host plant, these characters may later lead to the splitting up of this species.

From these records it is quite obvious that the species may become of some economic importance to tropical horticulturalists and its transportation to other countries where the avocado is grown should be more closely guarded against. Further observations are urgently needed to determine the probable extent of its depredations. Plate IX represents a pinned adult and lateral and ventral views of the pupa.

Mr. Schwarz said that the genus *Heilipus*, with its several hundred species, naturally will have quite a variety of food habits. One species, *H. guttatus* Boh., was bred by him last year from a section of a felled tree (probably a *Ficus*) at Paraiso, Panama, and was also collected at wounds on tree trunks in Guatemala. *H. albovenosus* was found by him at Tampico, Mex. in December, 1910, on the fruit of *Nectandra sanguinea?* (as determined by Dr. Rose), which has been formerly included in the genus *Persea*, with its probable larva within the fruit. Another species, *H. elegans*, breeds under the bark of camphor trees in Jamaica, as he noted some years ago (Proc. Ent. Soc. Wash., vol. IX, 1909, p. 15). Only one species of the genus, *H. squamosus*, is native in the United States (Georgia and northern Florida). It is extremely rare in collections and its habits are still unknown, but it may be found to develop in the fruit of *Persea borbonia* (*P. carolinensis*). A genus allied to *Heilipus*, *Calvertius araucariæ*, has been described by Dr. D. Sharp (Ann. and Mag. Nat. Hist., Jan., 1891, p. 150) from Chile, where its larvæ bore in the trunks of *Araucaria imbricata*. It may be added that three other small rhynchophorid beetles have been found to live in the seeds of the avocado. One of them is a calandrid beetle, *Caulophilus latinasus* Say, found in seed of the "Trapp" variety of avocado from Miami, Florida, in November, 1909. The second is a small undescribed scolytid of which a few specimens were found in the seed of an undescribed wild species of *Persea*, discovered by Dr. Henry Pittier at Boquete, 2,100 meters altitude, on the slopes of the Volcan de Chiriqui, in Panama, in April, 1911. The third is the cosmopolitan coffee weevil, *Aræcerus fasciculatus* De G., which appeared in numbers in old seeds from Livingston, Guatemala.

TWO NEW CALIFORNIAN ACROLOPHIDÆ.

(Lepidoptera.)

By August Busck

Acrolophus diversus, new species.

Labial palpi as in the abandoned genus *Neolophus* Wlsm., short, erect, reaching vertex; joints nearly equal in length, first and second slightly tufted, third smooth; dark brown, each scale tipped with ocherous. Face, head, and thorax ashy brown with ocherous scale-tips. Fore wings light ocherous brown with bluish black markings consisting of a series of equidistant costal dots, which is continued into a paler subterminal row; a large black second discal spot crossing the fold on the middle of the wing; the upper third of the wing is somewhat darker than the lower two-thirds and the entire wing is dotted with faint black transverse striations in longitudinal rows. Cilia light ocherous with equidistant black tufts. Hind wings blackish fuscous with an ocherous submarginal line. Abdomen blackish fuscous with ocherous anal tuft. Legs blackish brown with ocherous annulations on the tarsal joints; front tibiæ with long external scale tuft.

In some specimens the ornamentation on the fore wing is much less pronounced than in others and the black striation is sometimes obsolete, but the black costal dots and the two discal and plical spots persist.

Alar expanse, 27 to 28 mm.

Habitat: San Diego, California, July (Geo. H. Field, collector).

Type: No. 15122, U. S. Nat. Mus.; cotype in Mr. Field's collection.

Nearest in pattern and size as well as in the form of the palpi to *Acrolophus* (*Neolophns*) *persimplex* Dyar, from which it differs in the clearer color, more distinct pattern, and less hairy labial palpi.

Acrolophus hirsutus, new species.

Labial palpi as in the foregoing species, reaching vertex; ocherous, touched with dark brown. Head and thorax dark ocherous, mottled with black; thorax with short ocherous posterior tuft. Forewings ocherous, strongly suffused and mottled with dark brown and black; a faint series of terminal and costal dark dots, a black second discal spot, preceded and followed by a clear ocherous space, a short oblique plical spot, surrounded by light scales.

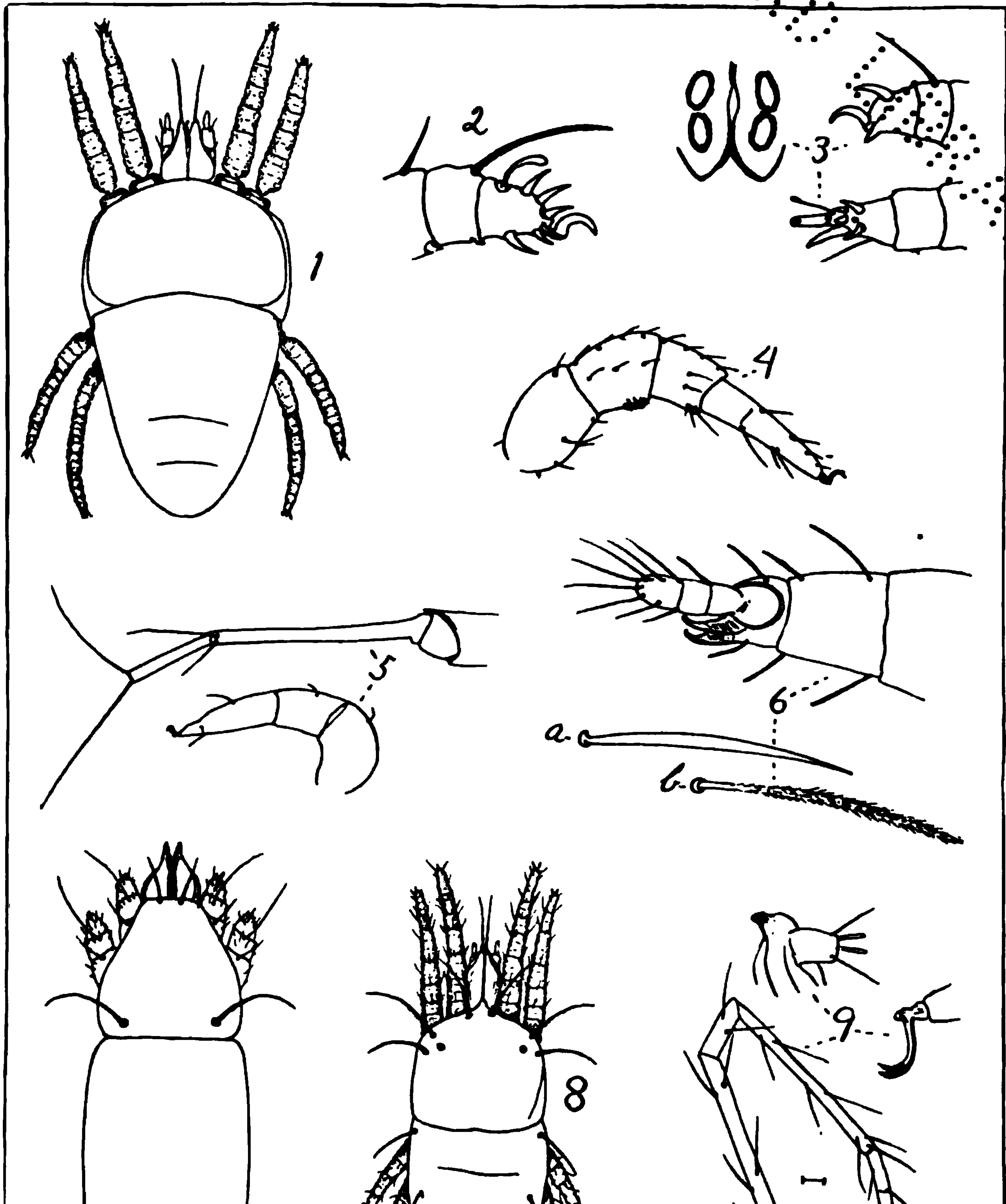
Hind wings dark brown with lighter base and a faint ocherous submarginal line. Abdomen dark brown above; anal tuft and under side ocherous.

Alar expanse, 20 to 22 mm.

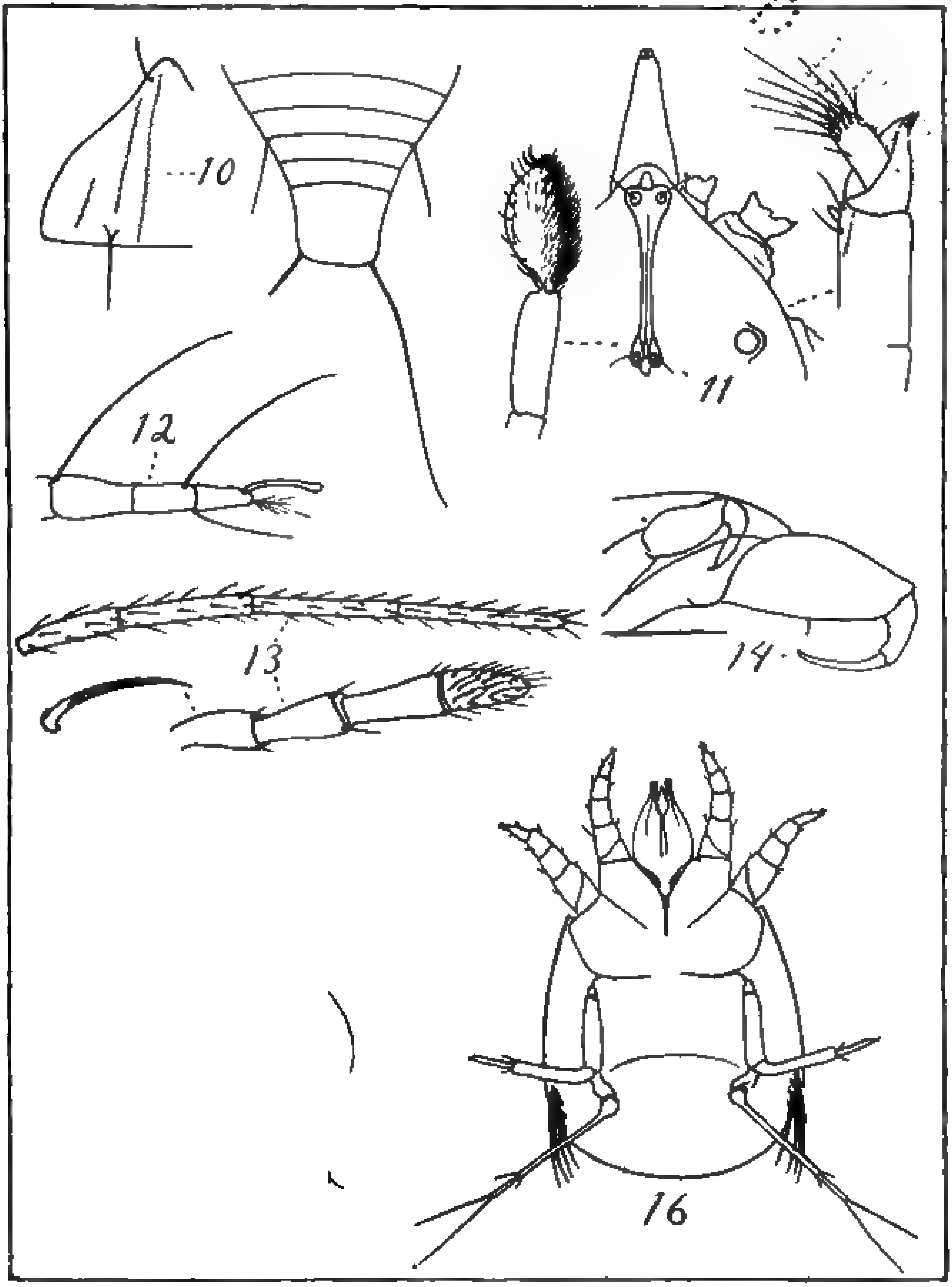
Hibitat: La Puerta Valley, California, June (Geo. H. Field, collector).

Type: No 15123, U. S. Nat. Mus.; cotype in Mr. Field's collection.

Actual date of issue, Sept. 30, 1912.



NEW AMERICAN MITES.



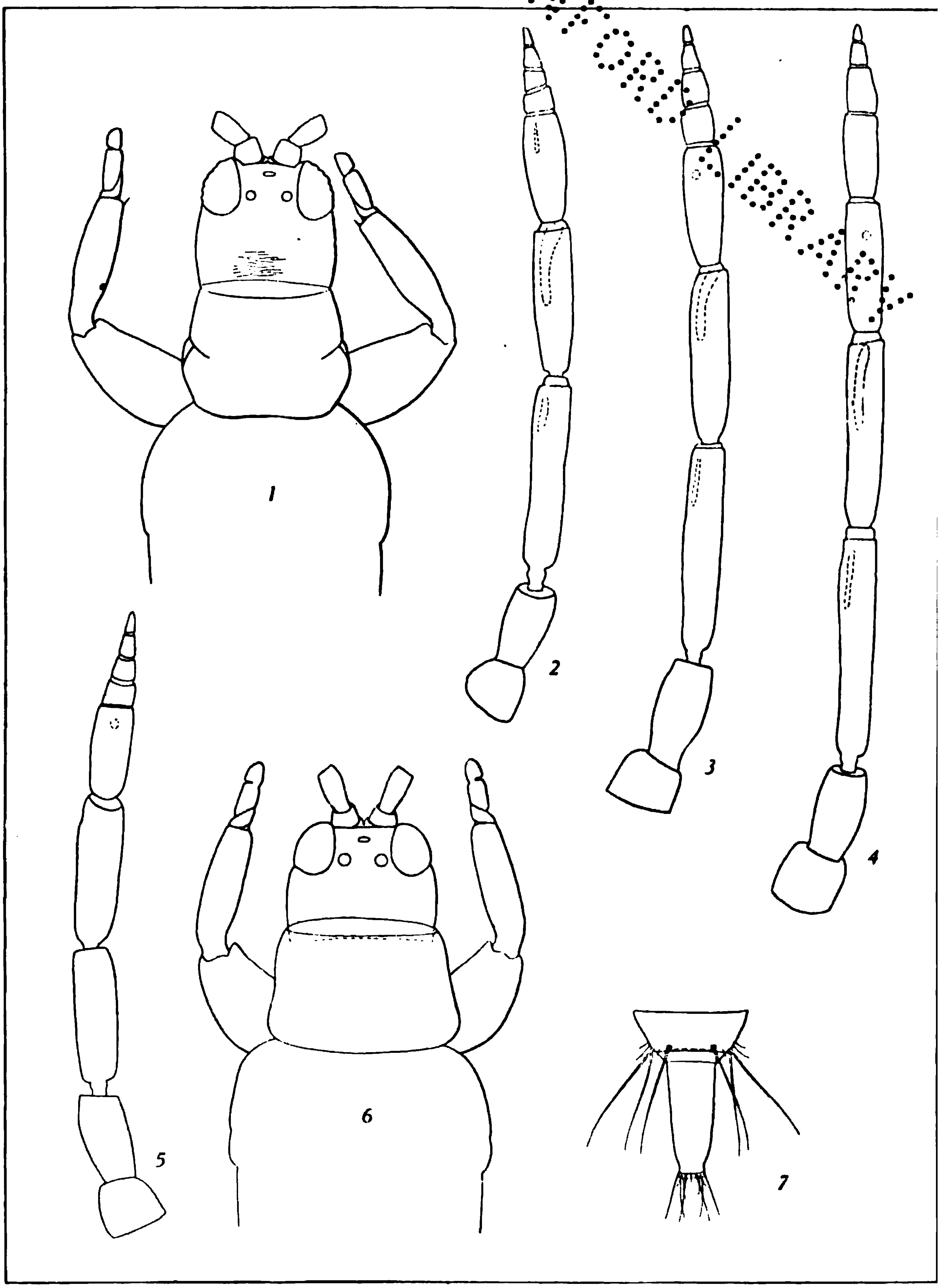
NEW AMERICAN MITES.

b *a* *b* *a*

FIG. 1.—*a*, *Termes flavipes* Kol. True queen (fertilized). *b*, Supplementary queen. (*a*, 14 mm.; *b*, 12 mm.)

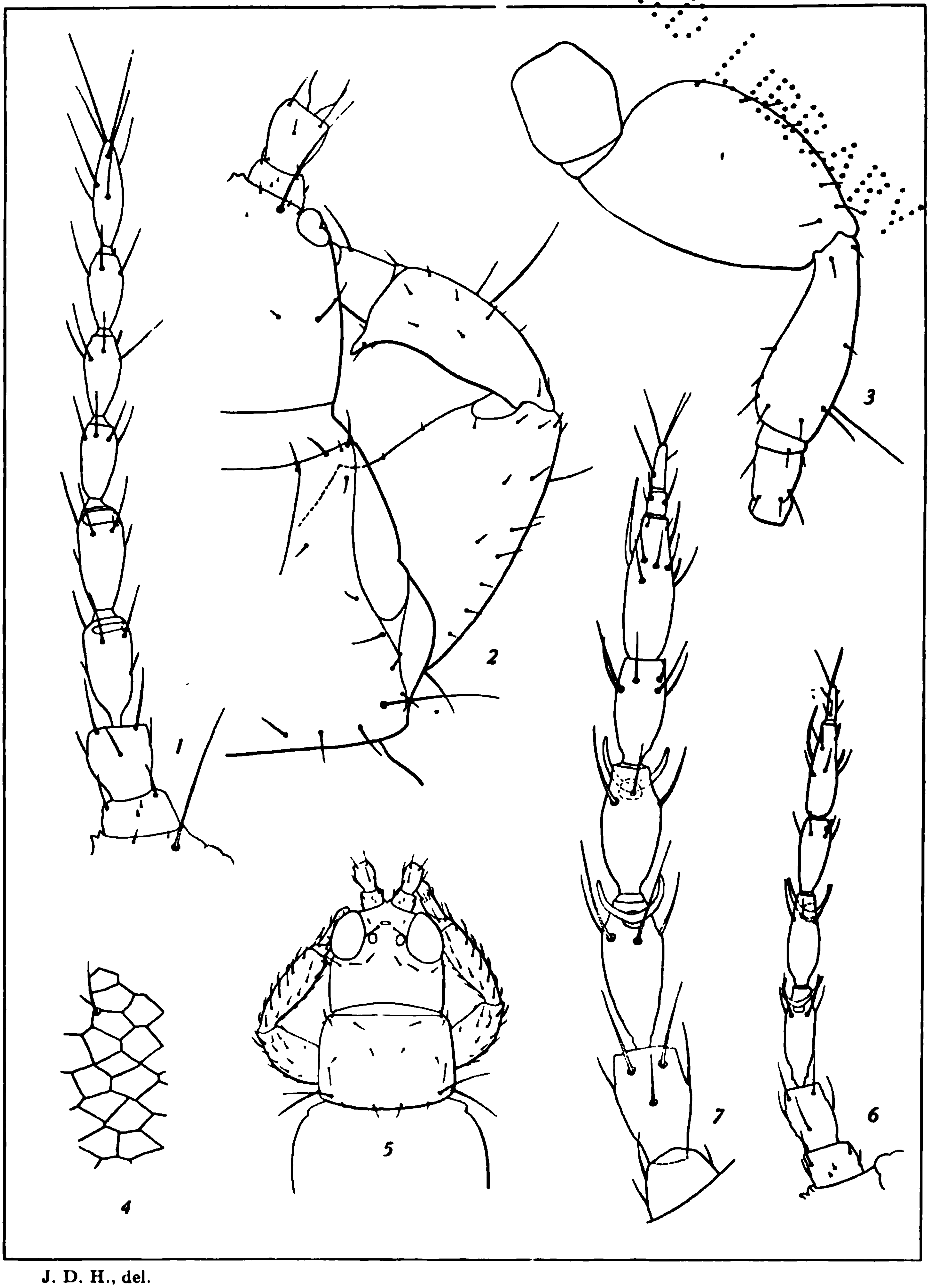
FIG. 2.—Same, showing deeper pigmentation of the chitinized parts of the true queen.

(Photos made between glass slides under alcohol by H. S. Barber.)



J. D. H., del.

NORTH AMERICAN THYSANOPTERA



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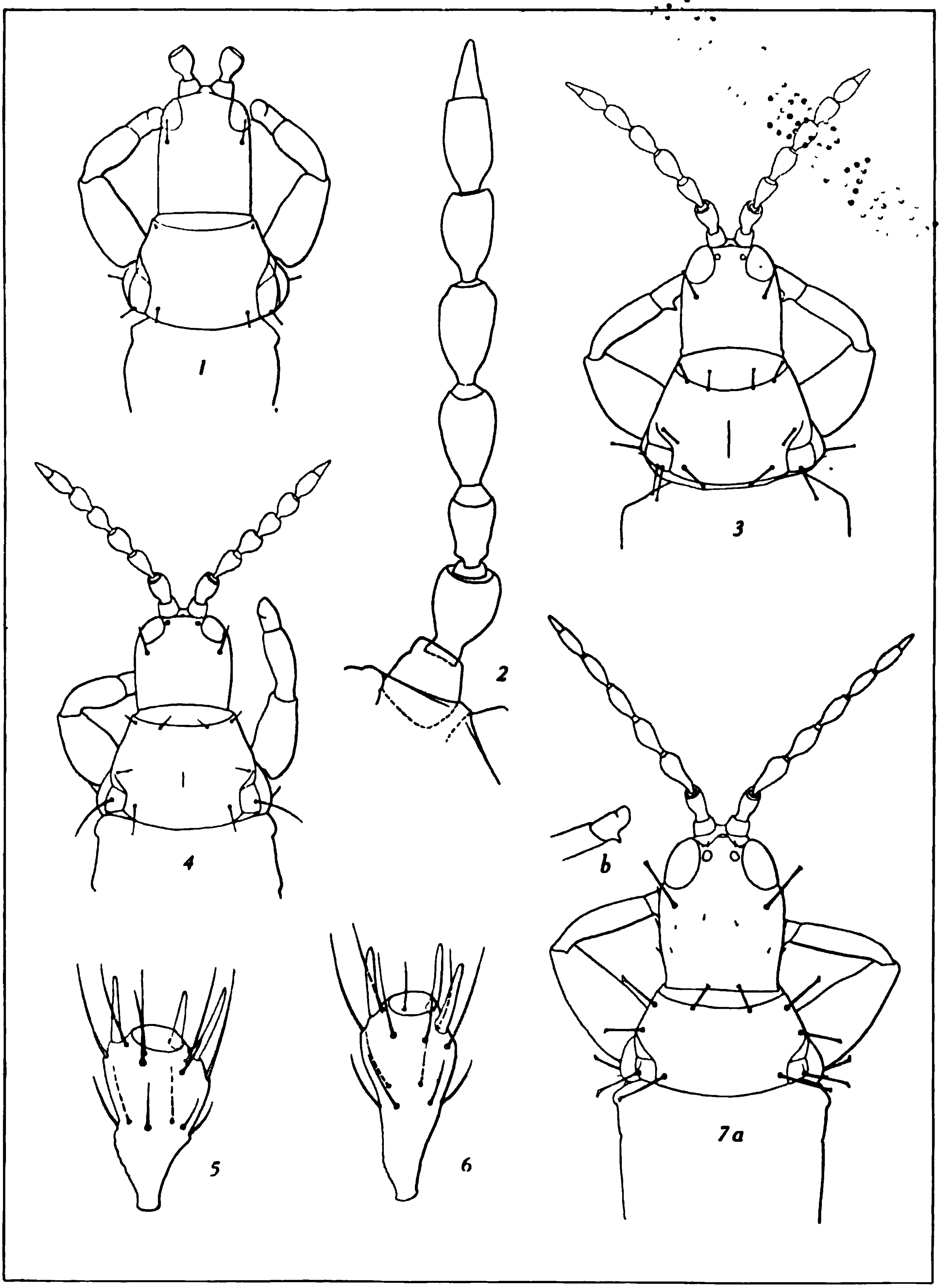

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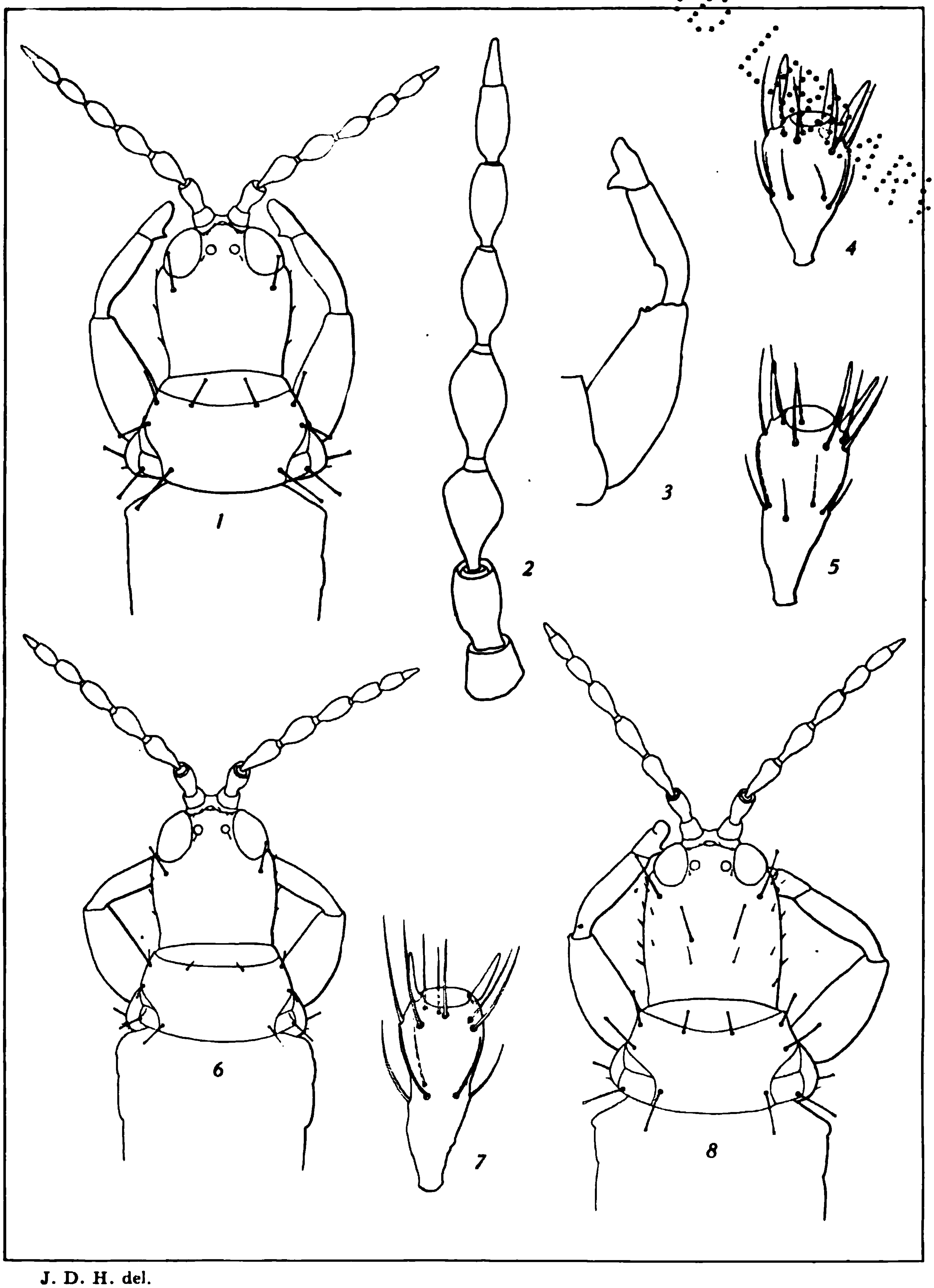

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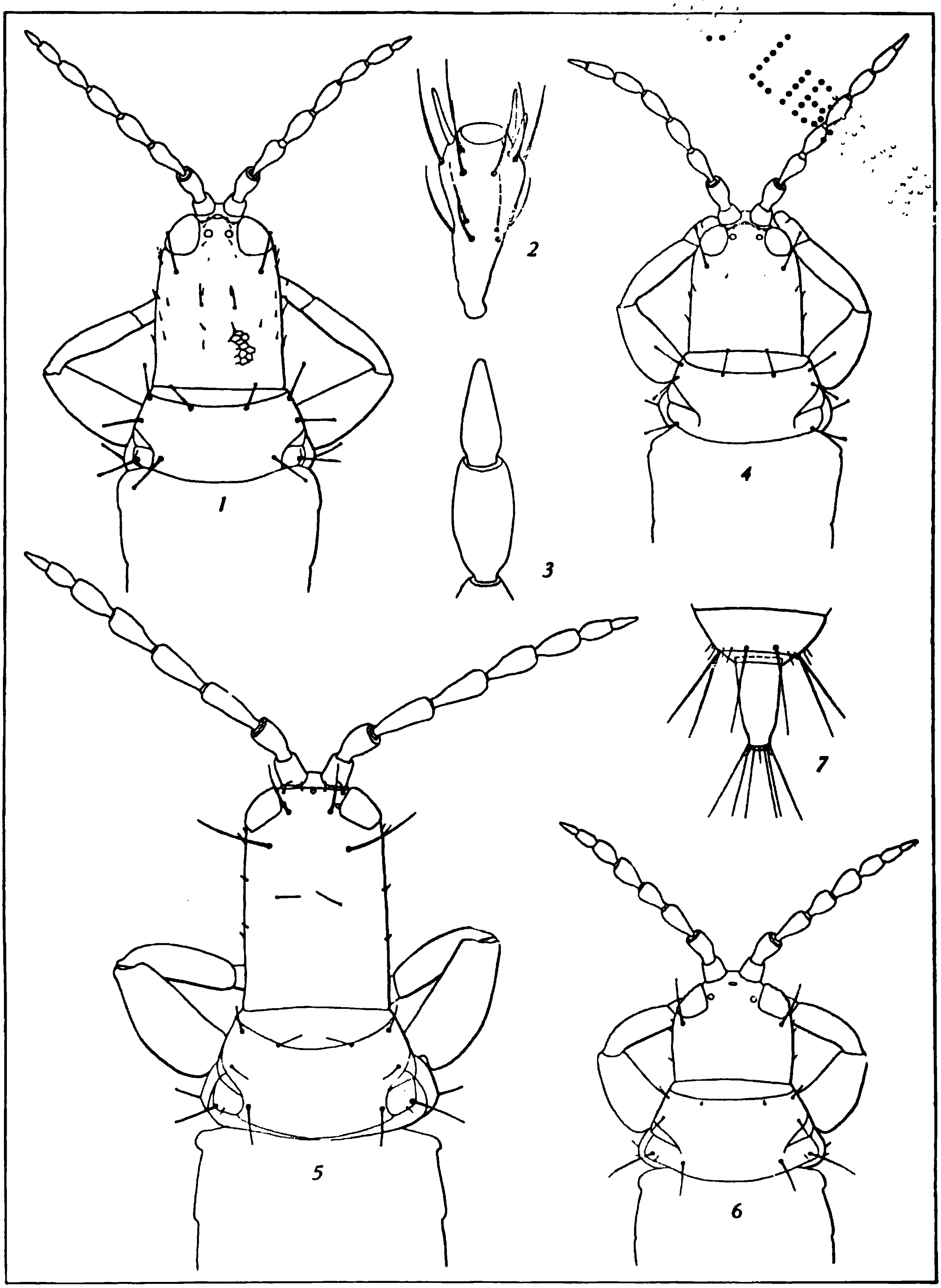

J. D. H., del.

NORTH AMERICAN THYSANOPTERA.

THE AVOCADO WEEVIL (HEILIPUS LAURI BOH.)

A NEW SPECIES OF TACHINIDAE

A NEW SPECIES OF TACHINIDAE.

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON.

VOL. XIV OCTOBER - DECEMBER, 1912. No. 4

MEETING OF APRIL 4, 1912.

The 258th regular meeting of the Society was entertained by Mr. Marlatt in the Saengerbund Hall, 314 C Street NW. on the evening of April 4, 1912, and there were present Messrs. Banks, Barber, Caudell, Ely, Gahan, Howard, Knab, McAtee, Popenoe, Quaintance, Sasscer, Schwarz, Snyder, Stedman, Vickery, members, and Messrs. F. C. Craighead, J. R. Malloch, C. S. Minot, and W. B. Wood, visitors. President Quaintance occupied the chair.

The minutes of the preceding meeting and of the special meeting of March 14, 1912, were read and approved.

Mr. W. B. Wood was elected active member.

The first paper of the evening, "Description of an injurious Otiorhynchid," by F. H. Chittenden, was read by title.[1]

The second paper, "Notes on Blood-sucking and Supposedly Blood-sucking Leptidæ," by Frederick Knab, was read by the Recording Secretary.[2]

Dr. Howard remarked that this added another family of Diptera to those to be considered in connection with insect-borne diseases. He inquired whether such diversities of habits within a genus is known among the families of Diptera generally considered blood-suckers.

Mr. Knab stated that this was the case in the Culicidæ. In this group we get closely related species, some of which are

[1] Published, Proc. Ent. Soc. Wash., XIV, 106, 1912.
[2] Published, Proc. Ent. Soc. Wash., XIV, 108, 1912.

habitual blood-suckers and must have blood for the perpetuation of the species, others that are indifferent blood-suckers, and still others that do not attack warm-blooded animals at all. And this condition repeats itself in a number of genera, so that it is clear that the habit can not serve as a guide to the exact systematic position of the species. In the case of the Leptidæ the habit perhaps appears so remarkable because we know so little of the habits of the group. Mr. Knab stated that he had been unable to find anything beyond the general statement that these flies are predaceous. He asked Mr. Malloch if he knew of any exact records by European entomologists.

Mr. Malloch said that he only knew that the Leptidæ are generally considered predaceous. The fact that *Leptis* rested upon tree trunks always with its head downward suggests that it watches for prey; its very sudden flight also suggests the predaceous habit.

Mr. Schwarz said: As to *Symphoromyia*, he had observed it on the wing, evidently hunting for prey among the bushes, although he had never actually taken one with prey. Too much reliance should not be placed on the structure of the proboscis. Mr. Green, of Ceylon, had sent a muscid fly, *Ochromyia jejuna* Fab., to Professor Poulton with the statement that it had been found preying upon termites. This observation had been questioned on the ground that the mouthparts of *Ochromyia* are unfit for piercing another insect. Although the flies were seen capturing the termites, Colonel Yerbury expressed his belief that the only possibility was that the termites had been injured in some way.

Mr. Malloch stated that he had observed the female of an anthomyid fly, *Spilogaster nigrinervis* Zett., which was feeding upon another fly, *Hilara litorea* Fall.; also a female and predaceous. In spite of the apparently inadequate structure of its proboscis the *Spilogaster* devoured the abdomen and all the softer parts of its victim, leaving only a small bundle of the chitinous parts. He had also seen *Spilogaster* preying upon small neuropteroid insects and upon Homoptera.

Mr. Knab exhibited a number of species of the genus *Atherix* and expressed the opinion that they are not all con-

generic. He showed *Atherix ibis* Fab., from Europe, and *A. variegata* Walk., from the northern part of our continent, and contrasted with them *A. longipes* Bell., and three other species, all from the warmer parts of America. The four tropical species agreed in their graceful form, longer and more slender legs and a number of evident characters. Mr. Knab said that he was unwilling to propose a generic name at this time, as a number of genera had been created agreeing in general characters with *Atherix* and usually placed as synonyms of it. The status of these genera should be carefully established before creating a new one.

Mr. Banks said that he was of the opinion that the southern forms are probably a new genus, since the European and Northwestern species of *Atherix* are locally common and if they are blood-suckers the habit would have been noticed long ago.

The third paper, "A New Genus and Species of Gryllidæ from Texas," by A. N. Caudell, was read by title.

A NEW GENUS AND SPECIES OF GRYLLIDÆ FROM TEXAS.

By A. N. Caudell.

TRIGONIDOMIMUS n. gen.

Description (Female, the male unknown).—This genus belongs to the subfamily Gryllinæ, but bears a strong superficial resemblance to *Cyrtoxipha* and related genera of small crickets of the subfamily Trigonidiinæ. The second segment of the tarsi is minute, not at all depressed or cordiform. Hind tibiæ more slender than usual in the subfamily Gryllinæ and armed above on the outer half with three spurs on each margin and on the basal part there are a few serrations, small but distinct when viewed through a hand lens. There are five apical calcaria, two ventral ones subequal in length and both short, scarcely as long as the tibial spines, and two longer ones on the inner side and one on the outer. On the inner side the middle calcar is about three times as long as the ventral one and the upper one a fourth longer than the middle. The second outer calcar is fully as long again as the ventral one. Metatarsus of hind tarsi rounded above, armed only with hairs, as are also the hind tibiæ between the spurs and serrations. Fore tibiæ furnished with foramina only on the anterior face. Head large and rounded, broader than the pronotum, the front convex; eyes very small and but little prominent. Antennæ inserted

immediately beneath the eyes, distinctly nearer the clypeal suture than to the top of the head. Apical segment of the palpi moderately enlarged apically and triangular in shape as common in many gryllid genera. Ovipositor approximately equaling the hind femora in length and almost straight.

Type: Trigonidomimus belfragei, new species.

Trigonidomimus belfragei, new species.

Head large; eyes small, broadly oval, and set far apart. Pronotum nearly quadrate, narrower than the head or the width across the base of the elytra. Elytra shorter than the abdomen, about three times as long as the pronotum; wings caudate, extending half their length beyond the tip of the abdomen. Anal cerci very long. Legs moderately slender, hind femora moderately swollen and tapering to the very tip, the hind tibiæ slender.

General color brownish yellow, the tip of the ovipositor and the eyes and the base of the antennæ blackish; the legs are clear honey yellow and the elytra are darker. The antennæ grow paler towards the tip.

Length, antennæ, 15+ mm.; pronotum, 1.25 mm.; elytra, 3.75 mm.; wings, 11 mm.; hind femora, 4.75 mm.; ovipositor, 4.5 mm.; anal cerci, 5.5 mm.; width, pronotum, 1.5 mm.

Two females, Texas, Belfrage.

Type: Coll. Museum of Comparative Zoology, Cambridge, Mass.; *paratype*, U. S. National Museum, Washington, D. C. (Cat. No. 15389). The type bears the following written label: "59 Quite rare specimens, coming to light at night Sept.-Oct."

At the conclusion of his paper, Mr. Caudell said he did not quite understand the significance of No ."59" which appeared on Belfrage's label.

Mr. Schwarz explained that Mr. Belfrage had the habit of numbering those species of each order which he collected himself in Texas and to distribute them always under the same number among his numerous correspondents and customers in the United States and in Europe, so that should these numbers be preserved it would add considerably to the identification of his specimens. Among the orthopterists in Europe he had a good customer in Professor Stal in Stockholm. Belfrage collected only at two points in Bosque County, Texas, viz, Waco and Clifton, although in his letters he constantly speaks of proposed trips to other parts of the State. At the instance of Dr. Le Conte he commenced about the year 1875 to write up a list of the insects collected in Bosque County.

As far as Mr. Schwarz recollects, only the list of the Coleoptera was ever finished, and he has seen this manuscript in the possession of Dr. Le Conte in the year 1878. However, it has never been published and the manuscript is probably still in the possession of Mrs. Le Conte. A small fraction of a copy of this list of Coleoptera in the handwriting of Belfrage, including the Carabidæ and Dytiscidæ, is still in the possession of Mr. Schwarz. Belfrage was not in the habit of labeling the specimens he sent to his correspondents; his peculiar and neat way of pinning and mounting render the specimens collected by him easily recognizable. Of the numerous letters Belfrage received from his correspondents from all over the world many are preserved in the National Museum. An obituary note on Mr. Belfrage will be found in the American Naturalist, 1883, p. 424.

—The fourth paper was "Notes on Some Nearctic Mantispidæ," by Nathan Banks.[1]

In connection with his remarks, Mr. Banks exhibited a new genus of Mantispidæ from Australia which appears in three striking color varieties. He also showed specimens of a new thynnid wasp, and a new genus of Scoliidæ from Arizona.

—At the conclusion of the regular papers on the programme President Quaintance called on Dr. C. S. Minot, of Cambridge, Mass., who responded with a few remarks on the early New England entomologists and related some very amusing anecdotes regarding Dr. Hagen.

—Under Notes and Exhibition of Specimens Mr. Banks exhibited a bottle of insects taken from a freshly painted house and suggested that there was something in the color as well as the odor that attracted them to it.

Mr. Barber stated as his opinion that the so-called attraction of painted surfaces is exaggerated. A more logical explanation in most cases would give greater importance to the temporary alighting and immediate continuance of flight in the seasonal swarmings of many insects caught on adhesive surfaces. Different species behave differently; with some insects the odor of paint will be attractive and with others repulsive.

[1] Published Proc. Ent. Soc. Wash., XIV, 178, 1912.

Pine-infesting scolitids and other insects are probably attracted by the odor of paint, while other insects not instinctively associated with turpentine odor are undoubtedly repelled. A common *Pityophthorus* was flying in great numbers along a woodland creek but did not appear to alight on his clothing. When, however, he stripped for a swim, he was greatly annoyed by their alighting and crawling, apparently due to the attraction of the light color.

Mr. Schwarz said that in his experience insects are not only attracted by light surfaces, but also by dark-colored ones if they are of sufficient size. He cited the north side of the old Department of Agriculture building, where in former years large numbers of specimens of various orders could always be found on each morning at the proper season.

Mr. Knab stated as his opinion that the reason for the common habit of many insects flying against white objects may perhaps be explained in that with their defective sight such objects are mistaken for open spaces—for example the openings among trees or other objects.

Mr. Schwarz related that in the month of March of the present year, while on the island of Key West, Florida, he had the experience of being stung by the big black scorpion *Centrurus gracilis* Latr., which is so common in tropical Florida. He was stung at the base of his right thumb and for some minutes the pain was most intense. No swelling followed, but the thumb as well as the whole hand was paralyzed for the rest of the day, the accident having happened about 11 o'clock in the morning. A dull pain extended from the hand nearly to the elbow, but did not prevent him from having good sleep. On the morning of the next day the pain had greatly lessened, but still he was hardly able to hold a pen for letter-writing, but there was no swelling of any extent and by evening the pain and paralyzed feeling had greatly subsided. On the third day hardly any effect of the sting was felt. No remedial measures whatever were applied. This scorpion feeds largely upon longicorn beetles, crickets, and roaches, which are so commonly found under bark of dead trees. In former years

he had found at Miami a female of this species with 26 young on her back.

Mr. Banks said that this species was one of our longest and was found from Florida to South America, in many places common. He referred to the poisonous scorpion of Durango, a species of *Vejovis*, of which Mr. Schwarz had received additional evidence of its poisonous qualities.

Mr. Schwarz added that a few years ago he was in company with Mr. F. C. Bishopp at Durango City, where upon their first arrival they were treated by the inhabitants with many accounts of the deadly nature of the "alacron" (*Vejovis* sp.). Hunting within the city produced only specimens of a common scorpion which is certainly not of a severely poisonous nature, and the accounts given by the natives were so contradictory that manifestly no reliance could be placed upon them. Information from more reliable sources elucidated the fact that the home of the real poisonous scorpion is the slope of the plateau towards the Pacific side, known as the Sierra de Durango, about 15 or 20 miles west of the city. This is a timbered country, whereas the city of Durango is situated on the bare plateau. It is from the Sierra de Durango that the specimens sent to Mr. Banks were collected. Mr. Schwarz added that while in Key West he met a most intelligent American who had resided for several years in the Sierra de Durango and who fully corroborated the former accounts of the severely poisonous nature of the "alacron."

In connection with scorpions, Mr. Schwarz said many people passing through Yuma, Arizona, have no doubt witnessed the performance of the Yuma Indians who come to the station at train-time, holding the big yellow scorpion, so common in that region, by the tail end and allowing the animal to crawl up their bare arms. The scorpions are offered for sale to the passengers, who usually pay liberally to be excused.

Mr. Quaintance exhibited specimens of an interesting aleyrodid received from Dr. C. W. Hooker, collected by him in Porto Rico, December 15, 1911. This species had recently been described by Dr. G. Leonardi in Bollettino del Labora-

torio di Zoologia generale e agraria della R. Scuola superiore d'Agricoltura in Portici, vol. IV. The insect is remarkable by reason of the long curling wax threads secreted by the pupa, of which there are only two pairs. The species falls in a new genus, as set forth in a forthcoming paper on the classification of the Aleyrodidæ by Messrs. Quaintance and Baker.

Meeting of May 2, 1912.

The 259th regular meeting of the Society was entertained by the bachelors in the Saengerbund Hall, 314 C Street NW. on the evening of May 2, 1912, and there were present Messrs. Barber, Caudell, Ely, Heidemann, Knab, McAtee, Quaintance, Rohwer, Russell, Sasscer, Schwarz, Vickery, Viereck, and Walton, members, and Messrs. J. R. Malloch, William Middleton, J. R. Strauss, and R. Wooldridge, visitors. President Quaintance occupied the chair.

Mr. Rohwer read a letter from Mrs. J. B. Smith, expressing her deep appreciation for the action of the Society in calling a special meeting on March 14, 1912, for the purpose of drawing up resolutions in recognition of the work of the late Dr. John B. Smith.

Mr. Schwarz brought up the question of a meeting in June and on a vote of the Society it was decided that such a meeting should take place.

Mr. Rohwer suggested that the Society take some action in electing a representative at the meeting at Oxford this summer, and after some discussion the matter was laid on the table until the next meeting.

At this juncture the question arose as to whether the Society should publish a biography of the late Dr. John B. Smith, and it was moved and seconded that Dr. Howard and Mr. Schwarz should draw up such a biography to be published by the Society.

The first paper of the evening was by H. L. Viereck, on "Entomology at the Centenary of the Academy of Natural Sciences of Philadelphia."

The second paper was by O. Heidemann, on "New North American Species of Tingitidæ."[1]

Under "Notes on Nearctic Orthoptera" Mr. Caudell spoke of a catalogue of the Orthoptera of Nearctic America which he has in course of preparation. Following his comments he presented a paper by T. D. A. Cockerell on "A New Genus of Orthoptera from Guatemala."

ENTOMOLOGY AT THE CENTENARY OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

By Henry Lorenz Viereck.

At the one hundredth anniversary of the Academy the whole field of the natural sciences was fittingly ·epresented. If any one branch of science paid more homage or received more recognition than another on this memorial occasion, then that honor belongs to entomology, for from the beginning until the end of the proceedings the great achievements of the Academy and of entomology, from modest beginnings, were brought out in the addresses.

Nineteen entomologists were appointed as delegates from at least seven distinctly entomological organizations and a number of more general institutions of learning. O the entomologist delegates Prof. P. P. Calvert, Prof. J. H. Comstock, Mr. E. T. Cresson, Prof. S. A. Forbes, Mr. Samuel Henshaw, Dr. W. J. Holland, Dr. L. O. Howard, Mr. C. W. Johnson, Dr. Henry Skinner, Mr. H. L. Viereck, and Prof. F. M. Webster were present at the celebration, which covered a period of three days or from March 19 to March 21.

The entomological organizations represented were the American Entomological Society, the Association of Economic Entomologists, Société Entomologique de France, the Entomological Society of America, the Entomological Society of London, the Entomological Society of Ontario, and the Entomological Society of Washington.

The entomological papers read were by Dr. Henry Skinner on "Mimicry in Butterflies," and Mr. James A. G. Rehn on "The Orthopteran Inhabitants of the Sonoran Creosote Bush."

The splendid entomological resources of the Academy were shown to the interested, who were also introduced to the n w entomological quarters just nearing completion.

In the address of the president at he opening exercises such entomological pioneers as Thomas Say, Titian R. Peale,

[1]To be published later.

Thomas B. Wilson, J. L. Le Conte, George H. Horn, Henry C. McCook, E. T. Cresson, and others were mentioned as the builders to whom we owe the entomological foundation laid down at the Academy. To quote, the president then said: "The knowledge gathered by the abstract naturalist and the tabulation of scientific data concerning all forms of animal and vegetable life have a very close and direct relation to public health and preventive medicine." Then he referred to such examples as yellow fever, malaria, sleeping sickness, and other diseases transmitted by insects, and pointed out what a boon it has been to humanity to know the minutest details of the life history of such creatures. To quote again, the president said: "The work of the Academy has been so distinctly pure science that the lay public have not until recently appreciated the great practical relationship it has to health and economics. The description of the various species, their life history, the geographical range, have enabled those working in applied sciences to conduct the already successful war against the enemies to man, to the lower animals, and to plant life." Then he went on to show what a great intrinsic loss to our food supply and comfort was due to the depredations of insects, quoting the latest statistics to this end.

Dr. Edward J. Nolan, the esteemed secretary of the Academy, under the title of "Reminiscences," gave interesting accounts the results of his opportunities to observe men of science, and mentioned Thomas Say as one of four men who had stood out prominently in the first century of the Academy.

The meetings, the entertainments, and every feature of this memorable centenary of one of the foremost institutions of its kind in the world were so inspiring and genial that all who attended were happy to be present.

RECOGNITION OF PALINDIA MERRICKI HOLLAND.

This species was described from a specimen taken flying in low herbage near New Brighton, Pennsylvania. The describer recognized that it was a stray from the tropics, but he could not locate it specifically. Recently in going over the *Palindia* in the National Museum collection, I found a series of this species under *P. egista* Bar. There were, however, two forms confused, and as Bar plainly indicates the other form as *egista* the name *merricki* will stand. Our specimens are from Venezuela. Probably the original specimen reached Pennsylvania as pupa with tropical fruit.

HARRISON G. DYAR.

A NEW GENUS OF ORTHOPTERA FROM GUATEMALA.

BY T. D. A. COCKERELL, *University of Colorado.*

Among the Orthoptera recently collected by my wife at Quirigua, Guatemala, is a large *Ceuthophilus*-like species, which I could not place in any described genus known to me or referred to in the literature at my command. Thinking that it might have been described in the Biologia Centrali Americana, I sent a brief account of it, with sketches, to Professor L. Bruner, who kindly writes me that he finds no such insect described, adding: "Undoubtedly your insect is new, and comes near *Glaphyrosoma.*"

MAYACRIS gen. nov. (STENOPELMATINÆ).

Female.—A large insect, with the general form and color of *Ceuthophilus,* entirely apterous; feet with pulvilli; hind tibiæ on upper side with two rows of short spines, all of the same type or grade. Head oblong, not wider than thorax; eyes elongate, twice as long as broad; ocelli represented by large oval chalky-white patches, one on the prominence between the antennæ, the others on each side of the broad flattened frontal prominence; vertex not tuberculate; clypeus much narrowed below, the lower half strongly longitudinally sulcate in middle; labrum large, broad-oval not in the least emarginate, with scattered hairs; mandibles with strong apical teeth; third joint of labial palpi as long as the other two together; maxillary palpi with joints 2 to 4 greatly elongated, the fifth flattened and spoon-like; antennæ more than twice as long as body; prothorax large, smooth, its lateral inferior margins nearly straight; anterior coxæ with a strong but short spine; anterior tibiæ with a sulcus on each side, at the upper end of which is a rounded pallid foramen-like depression (wholly unlike the foramina of the Decticinæ, however); femora wholly unarmed; anterior tibiæ with two rows of five spines each on lower side, the last three of each row crowded toward the apex; there is also an apical spine on inner side; middle tibiæ with the same ten interior spines, and also six superior ones, in two rows, the last of each row apical; hind tibiæ with two rows of ten short spines above, none apical, no spines below except at apex; apex of hind tibiæ with two very large spines (about as long as first joint of tarsus) on inner side and two not so large on outer, and in addition two pairs of spines beneath, the most apical pair larger and close together at base; first three tarsal joints strongly sulcate or excavated beneath, and variously produced at apex, but not in the least spinose; the tarsal joints are only moderately compressed; ovipositor very short, compressed, gently curved upwards.

Mayacris bruneri, sp. nov.

Female.—Body smooth and shining, about 26 mm. long, dark purplish brown above, very pale yellowish beneath; frontal prominence dark pur-

plish, invaded from behind by two lobes of pale ochreous color; clypeus pallid with two suffused brownish patches; maxillary palpi about 15.5 mm. long; cerci about 5 mm.; ovipositor slightly over 4 mm. in length; anterior femora 9 mm., their tibiæ 9.5; hind femora shining, pale purplish-brown, 22 mm. long, the greatest depth not quite 6 mm.; hind tibiæ 20 mm., dusky at base, pallid apically; hind tarsi a little over 7 mm.; third antennal joint longer than the next two combined.

Habitat: Quirigua, in the tropical lowlands of Guatemala, February, 1912 (W. P. Cockerell). The generic name is derived from the Mayas, who in ancient times erected splendid temples and monuments at Quirigua. The species is dedicated to Professor Bruner, who has done so much to make us acquainted with the Orthoptera of Central America.

Type: Unique female, Cat. 14799, U. S. National Museum

This insect bears a superficial resemblance to certain members of the Rhaphidophorinæ, but its structure shows it to belong to the Stenopelmatinæ.

I take this opportunity to record a few other Orthoptera collected by Mrs. Cockerell at Quirigua, and kindly determined by Mr. A. N. Caudell: *Neolobophora ruficeps* Burm., *Homeogamia mexicana* Burm., *Periplaneta australasiæ* Fabr., *Stagmomantis fraterna* S. & Z., *Harpagonyx maya* S. & Z., *Heteronemia incongruens* Brunn., *Arnilia marschalli* Bruner, *Xiphidion mexicanum* Sauss., and *Amphiacusta azteca* Sauss.

Mr. Caudell said that except for a character not mentioned in Professor Cockerell's description, i. e., the absence of apical spines above on both margins of the hind tibiæ, he would be inclined to consider the above genus inseparable from *Glaphyrosoma.*

—Under Notes and Exhibition of Specimens, Mr. Caudell spoke of the great numbers of insects found on snowbanks in high altitudes. He mentioned particularly observations made in July on Pikes Peak, when hundreds of insects, mostly ones ascended from lower altitudes by flight or ascending currents of air, were seen on snow. He reasoned that these snowfields caught the ill-seeing eyes of the insects, and attracted them, otherwise some few would most certainly have been found on the grass or stones in the vicinity. But only one small beetle, a native of high altitudes, was found in any numbers anywhere except on the snow-fields.

—Mr. Caudell spoke briefly on the desirability of miscellaneous observations being published. He pointed out that even

the most fragmentary notes made and published by different observers on the habits and development of insects often accumulate into more or less complete life histories. Care should be taken to not duplicate published articles along these lines, but the republication of known facts is not necessarily to be decried, as such often serves as a check on the results as published by others.

MEETING OF JUNE 6, 1912.

The 260th regular meeting of the Society was entertained by the married members at the Saengerbund Hall, 314 C Street NW., on the evening of June 6, 1912, and there were present Messrs. Cory, Cushman, Ely, Gahan, Heidemann, Knab, Myers, Quaintance, Rohwer, Sasscer, Schwarz, Snyder, and Wood, members, and Messrs. F. C. Green, Fritz Johansen, and J. R. Malloch, visitors. President Quaintance occupied the chair.

The minutes of the preceding meeting were read and approved.

The name of Reginald Wooldridge was proposed for active membership and in accordance with the rules laid over until the next meeting.

Under unfinished business Mr. Rohwer brought up the question of a delegate to the Oxford meeting, and after some discussion it was moved and seconded that the matter be referred to the Executive Committee with power to act.

Mr. Schwarz gave a brief report as a member of the committee to draw up a biography of the late John B. Smith, and Mr. Rohwer moved that the committee be relieved. Seconded by Mr. Gahan, and carried.

The first paper of the evening was "A New Tachinid from Porto Rico," by W. R. Walton, and in the absence of the author is was read by Mr. Rohwer.

A NEW SPECIES OF TACHINIDÆ FROM PORTO RICO.

(Plate X.)

By W. R. Walton.

The tachinid parasites on the adult beetles of the genus *Lachnosterna* so far as recorded seem to be confined to two genera, namely, *Cryptomeigenia* B. & B., and *Eutrixa* Coq. Although the above-named genera have been widely dissociated in all the tables classifying the family, they are not dissimilar in general appearance, though varying in size, and may well be much more closely allied than has generally been acknowledged. But two species, belonging to each of the genera before mentioned, have hitherto been recorded as b ing parasitic on the adults of *Lachnosterna*, the habits of the remainder of the species included being as yet unknown to science. The hitherto known are *Eutrixa exile* Coq., and *Cryptomeigenia theutis* Walker, the host of which is mentioned below. One other North American species, namely, *Microphtalma disjuncta* Wied., is known as a larval parasite of "May beetles." This was reared from a larval skin of *Lachnosterna arcuata* by Mr. Theo. Pergande, October 5, 1891. *Microphthalma* occurs also in Europe, where it will probably be found to parasitize the larva of *Melolontha*.

The genus *Cryptomeigenia* was erected by Brauer and Bergenstamm[1] in 1891 from a single male specimen collected in Brazil and which they called *setifacies;* although Walker[2] had previously described a species, namely, *theutis*, under the old genus *Tachina;* it was evidently overlooked by the authors of the genus. The late Mr. D. W. Coquillett was, it seems, the first person to recognize this species as being congeneric with *setifacies* B. & B., and we find it referred to its proper place in his indispensable "Revision of the North American Tachinidæ." Brauer and Bergenstamm's description of *Cryptomeigenia setifacies* is in a large degree unsatisfactory because of its lack of specific detail, but since it disagrees in some important particulars with several specimens in hand, and as it is impossible for the author to see the type, a new species is herewith proposed for their reception, which is called *aurifacies*. This is obviously distinct from *theutis* of Walker, which is known as a parasite of *Lachnosterna* in the northern United States, having been reared from an adult of *Lachnosterna inversa* Horn, by Mr. Theodore Pergande, at Washington, D. C., in 1892.

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[1] Zweiflüg. des Kaiser. Mus., v, 331, 1891. [2] List, IV, 228.

SYNOPSIS OF GENUS CRYPTOMEIGENIA B. & B.

1. Dorsal vittæ of thorax distinct velvety black 2
   Dorsal vittæ of thorax indistinct brownish, pollen of front and face gray .... *theutis*, Walk.
2. Legs except tarsi yellow. Second and fourth longitudinal veins yellowish .... *setifacies* B. & B.
   Legs black, wing veins black, front and sides of face golden yellow .... *aurifacies* n. sp.

Cryptomeigenia aurifacies, new species.

Length 3 to 10 mm. Eyes apparently bare, but microscopically haired, frontal vitta opaque, dark brown, somewhat lighter approaching root of antennæ; sides of front golden yellow pollinose extending narrowly upward around sides of ocellar triangle and connecting with the posterior orbits, which are also yellow pollinose. Sides of face golden yellow pollinose, barely connecting beneath the eyes with the yellow of posterior orbit. Anterior two-thirds of parafacials with fine, black, bristly hairs. Facial ridges when viewed from side, brown and haired on lower one-fourth only. Cheeks, facial depression, and epistoma grayish pollinose. First two segments of antennæ reddish and abundantly haired on upper surfaces, third joint slender, gently rounded at tip, black. Arista about twice the length of third joint, thickened on basal one-fourth, microscopically pubescent for a little more than one-half its length, black.

Thorax, pleuræ, and pectus, including coxæ, grayish pollinose, slightly yellowish gray at humeri and in supra-alar region. Thoracic vittæ four, velvety black; the inner pair slender anteriorly, entire, thickened posteriorly beyond the suture, ceasing about midway between suture and anterior edge of scutellum, the outer abruptly thickened anteriorly and interrupted at suture extending backward to a point immediately above center of postalar callus.[1] Post-dorso-central bristles three, sternopleural bristles three, the lowest of which is in the male often quite weak. Scutellum with two marginal and a long apical pair and many rather coarse hairs on the disk. Abdomen somewhat conical, silvery-gray pollinose; when viewed from the rear the posterior margins of segments 1 to 3 broadly, and a narrow median vitta, slightly shining, black. Fourth segment almost entirely gray pollinose. Segments, 1 with marginal and 2, 3, and 4 with discal and marginal macrochætæ. Tip of ovipositor in female exserted, acute, and pointing forward.

Wings hyaline, veins black; posterior cross-vein sinuous.

Squamæ translucent, yellowish white. Trochanters and extreme apices of femora reddish, remainder of legs and tarsi black.

[1] In viewing marking of thorax and abdomen in Tachinidæ one should always look at them from the rear at a vertical angle of about 45°, the markings appearing most intense at this angle.

Habitat: Porto Rico.

Described from six specimens, male and female, reared from the "sugar cane May-beetle"[1] by D. L. Van Dine, collected April 29, 1912 at Anasco, Porto Rico.

Type: Deposited in U. S. National Museum, Washington, D. C.

Under Notes and Exhibition of Specimens Mr. Rohwer mentioned having bred the fly *Dasyllis thoracica* from the galleries of a scarabæid beetle in chestnut. This may establish a parasitism for this fly, which collectors have often found flying around old stumps infested by beetle larvæ.

In answering Professor Quaintance's query in regard to the important parasites of *Lachnosterna* larvæ, Mr. Rohwer stated that the people in Porto Rico were working more with the hymenopterous parasites than they were with the dipterous. They have bred one species belonging to *Campsomeris* and are trying to introduce a species of *Tiphia* from the middle United States with the hope that this species will work effectively as a parasite to the *Lachnosterna* larvæ in Porto Rico. Professor Froggatt, of Australia, has bred a species of *Scolia* from the larvæ of white grubs in Australia and has carefully described and figured these parasites of white-grub larvæ. Mr. Rohwer stated that he was of the opinion that the people of Porto Rico could do better if they worked more extensively on the species belonging to family Scoliidæ and did not endeavor to introduce North American *Tiphia*, as it is doubtful if the species *Tiphia* will acclimatize themselves to Porto Rico. He also stated that most of the North American species of *Tiphia* which live in the eastern United States have been considered to be *Tiphia inornata*, but that there are really many forms which belong to this specific group and that the species of the Middle West, in the main, are different from the species of the Atlantic Coast. Judging from the diverse species it is impractical to endeavor to introduce *Tiphia inornata* into Porto Rico. As most of the species which belong to this group

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[1] Mr. E. A. Schwarz says that this is in all probability *Lachnosterna crenatocollis* Blanchard.

of families in Porto Rico are of the family Scoliidæ, it would be much better to endeavor to work with these rather than with the species of the family Tiphiidæ.

—Under a discussion of geographical distribution Mr. Knab remarked that Diptera as a whole are not as widely distributed as is generally supposed, but when carefully studied are found in most cases to be equally restricted in habitat with other insects not so well equipped for locomotion. Most of the species that show an exceptionally wide distribution are such as are favored by human activities. Aside from these the supposed wide distribution is based largely on inexact identification, similar species in different areas being confused. It will, accordingly, be found that the more obscure species, and the groups least understood, show the widest distribution. Another factor to be guarded against is errors in labeling. These are particularly to be guarded against in the collections of the older entomologists, who cared little for exact data of this kind and often did not affix locality labels to their specimens. Thus the labels on some of the older material in the National Museum collection are obviously wrong and in some cases have gone on record. Some striking cases have turned up among the material from the collection of the late Mr. Coquillett. His collection consisted largely of material collected by himself in northern Illinois and around Los Angeles, California. The collection came to the Museum unlabeled and was afterwards labeled by an assistant. It was inevitable that errors should occur. A striking case is *Psorophora ciliata*, which was recorded by Dr. Dyar from Los Angeles on the strength of a specimen from the Coquillett collection. The species has not been found in California by anyone else, nor at points farther west than Texas, and Mr. Knab said that he was convinced that the species does not occur in California. Mr. Knab said that he believed that we have another case of this kind in *Simulium bracteatum* Coquillett, the types of which are labeled "Cambridge, Mass." and "Los Angeles Co., Cal." Specimens from other eastern localities have since been turned up, but none from California, and the latter record is to be looked upon with suspicion.

Mr. Malloch said: There are certain causes which limit the geographical distribution of an insect, and one of the principal factors in the limitation of phytophagus species is the range of the food plant. Although the species may not necessarily occur everywhere its food plant does, it does not occur where the plant does not, unless in certain cases where there may be closely allied plants upon which it may feed. This principally applies to Trypetidæ. In the case of species feeding on carrion or decaying vegetation the distribution is not governed by the occurrence of their food, but by climatic and other factors. Of the 29 British species of *Fannia*, an anthomyid genus of habits last referred to, he took 23 species within a radius of 5 miles in Scotland, and of these 16 occur in North America, which is a much larger proportion than is the rule in other groups, and particularly in the phytophagus genera.

Meeting of October 3, 1912.

The 261st regular meeting of the Entomological Society of Washington was entertained by Mr. Schwarz at the Saengerbund Hall, 314 C Street NW., on the evening of October 3. Present, Messrs. Barber, Busck, Caudell, Corey, Cushman, Dyar, Gahan, Gill, Heidemann, Hopkins, Myers, Popenoe, Quaintance, Rohwer, Schwarz, Stedman, Symons, and Walton, members, and Messrs. J. D. Hood, W. Middleton, J. B. Parker, and R. C. Shannon, visitors.

President Quaintance occupied the chair, and in the absence of Mr. Sasscer, Mr. Busck was asked to act as Recording Secretary pro tem.

The minutes of the preceding meeting were read and approved.

Mr. Caudell proposed the name of Mr. J. D. Hood, Mr. Rohwer the names of Messrs. F. Johansen and W. Middleton, Dr. Hopkins the name of Mr. C. T. Green, and Mr. Busck the name of Mr. Carl Heinrich, for active membership. These names were laid over according to the rules.

The President informed the Society that Mr. R. Wooldridge, whose name had been proposed at the last meeting, had asked

to have his name withdrawn on account of his unexpected removal from Washington, and in view of this his name was not voted on.

The first paper, "Notes on Nearctic Orthoptera. I. Non-saltatorial Forms," was read by the author, Mr. A. N. Caudell.[1]

Discussing Mr. Caudell's paper, Mr. Schwarz asked how the number of species of Phasmidæ in arid regions compares with the species from the more humid regions. Mr. Caudell replied that it was his impression that the species recorded from arid regions are somewhat less than those from more humid areas.

Professor Quaintance asked how many cave species occur in the Orthoptera. Mr. Caudell answered that aside from the species of the genus *Hadenœcus*, which are mostly confined to caves, there are few of our species peculiar to caves.

Professor Symons asked what the distribution of *Diapheromera femorata* is. Mr. Caudell stated that it occurs all over the north and south into Texas, where it is replaced by *D. velli*, which, however, ranges north as far as New York.

Mr. Busck remarked that he was glad to note that Mr. Caudell had united genera and subgenera, which differed only in secondary sexual characters, and the generic value of such characters was discussed at some length.

Mr. Caudell said that it is his opinion that genera based only on secondary sexual characters should not stand, but so far he has not carried this out radically.

Mr. Schwarz remarked that in Coleoptera the secondary characters situated in close proximity to the primary sexual characters have been and still are successfully used as generic characters; the more remotely they are situated from the primary sexual characters, the more they lose their value as generic characters, without, however, losing their value as one of our best means of distinguishing species.

Mr. Barber asked Mr. Busck what constitutes a secondary sexual character, to which Mr. Busck responded that he con-

[1] To be published in the Proceedings of the United States National Museum.

siders any difference between the sexes outside of the primary sexual characters to be such. Mr. Barber then asked what one was to do in such groups as the Strepsiptera and the coleopterous group Phengodini, in which there is not a single structure common to the opposite sexes.

Dr. Hopkins interpreted secondary sexual characters as those external characters which are peculiar to either sex and finds that the combination of these characters on both sexes of the same species serve as good generic characters.

Mr. Knab said that in the Diptera he considered the employment of secondary sexual characters objectionable. These are often misleading; as similar modifications may rise independently at different points they can not be relied upon as indications of relationship.

Mr. Walton said that in the Tachinidæ the late Mr. Coquillett quite successfully and wisely avoided the use of secondary sexual characters in the delineation of his genera. On the other hand, Mr. C. H. T. Townsend has made very general use of these characters in erecting genera, even when the genotype happened to be a unique. The genus *Ennyomma* Townsend was erected on a unique male solely because of the fact that this specimen possessed hairy eyes. This genus was split off from *Myiophasia* B. & B. In a series of 24 specimens of *Myiophasiu ænea* Wied. reared as parasites of *Chalcodermus æneus* Boh. by G. G. Ainslie, of the United States Bureau of Entomology, at Clemson College, South Carolina, the males have hairy eyes and the eyes of the female are bare. The amount of pilosity of the male eye varies from a few scattered hairs to the densely hairy form. Notwithstanding this, Mr. Townsend persists in declaring that "the genus may be distinguished from both *Myiophasia* and *Phasioclista* by its thickly hairy eyes." From the above-mentioned facts, however, it will be seen that this hairiness is extremely variable, and at best is a secondary sexual character, and as such, in Mr. Walton's opinion, should not be used as a primary character for the erection of a genus in Tachinidæ.

Dr. Gill remarked that supplementary sexual characters developed independently of the real sex organs are used to a

large extent in mammals and in birds; they are sometimes developed in a remarkable manner, as in the birds of paradise, of which some 20 or 30 species in nearly as many genera are distinguished and recognized by all ornithologists entirely on these accessory characters, such as peculiar feathers on the forehead, tail, or elsewhere, found in the male, while the female is quite ordinary. Dr. Gill said that if such a male were divested of its feathers it could not be recognized generically.

—Dr. Hopkins spoke of a minute scolytid beetle from the Philippines, in which the tibia of the male is very broad and carries very long, branched, featherlike hairs and a long spine, neither of which is found in the female.

—Dr. Dyar showed a copy of "Moths of the Limberlost," by Gene Stratton Porter (pub., Doubleday, Page & Co., 1912). This is a book intended for "nature lovers," not for students or even beginners. It gives a general account of the appearance and habits of some of our larger moths and of the doings of the author and members of her family in relation to these moths, all very entertainingly told. The author herself has apparently been very unfortunate in her use of books. Harris's "Insects Injurious to Vegetation," which would probably have been her best guide, she seems never to have heard of. She searched in vain through Holland's "Moth Book" and Packard's "Guide to the Study of Insects" for details of the life histories of two species of *Catocala* that came under her notice. The authors of these works, as well as other entomologists, receive scant courtesy at her hands, which seems scarcely edifying and somewhat detracts from the tone of the book. The two species of *Catocala* referred to above, *C. amatrix* Hubn. and *C. neogama* S. & A., are well-known inhabitants of the cottonwood and hickory, respectively, overwintering in the egg state in crevices of the bark after the manner of other species of the genus. Is it a fact that these well-known details of the histories of our moths are so buried in the literature that one comparatively unacquainted therewith can not find them out? We scarcely think so, but attribute the failure to the author's ill fortune in selection of literature and advisors. In another place (p. 343) the author expresses the

opinion that *Citheronia regalis* is "beyond all question" of tropical origin. This is true, of course, of the genus, but the author is speaking of the species, which is confined to the United States east of the Plains, as is well known. Some little space is devoted to a discussion of the ground color of the fore wing of this species. It appears that Dr. Packard described it as olive green, whereas Mrs. Porter insists that it is gray, and she wonders who is color-blind. As a matter of fact, the lady is right—it is gray; but the optical effect of the contrast of the red veins on the neutral gray ground gives the effect of the complementary color, green, so that the general impression is of an olive-gray wing. This is the impression I had carried of the species myself, and in a way justifies Dr. Packard's description. Many interesting photographs from life are found in the book and several colored plates, reproduced from paintings by the author, in which she has tried to represent exactly the colors at their best, sometimes somewhat to the detriment of the markings.

—Dr. Dyar also showed a copy of "Elementary Entomology" by E. D. Sanderson and C. F. Jackson (pub. Ginn & Co.).

—Mr. Caudell stated that Señor Federico Mejia, minister from Salvador, brought to his office yesterday for identification and information an adult pair of a locust which threatens to become, if indeed it is not already, a most serious pest to the coffee bean. Some weeks ago immature specimens were sent in, but the species could not be determined, though it was clear that it belonged to the genus *Cocconotus*, a genus of the subfamily Pseudophyllinæ. Mr. Caudell had not yet had an opportunity to determine the species, but the adults which he had for exhibition are very surely the same as some brought from Salvador some years ago by Mr. Knab, who stated that they were injurious to the coffee bean and leaf, according to the reports of the natives. Señor Mejia stated that these insects occur in immense numbers and cause thousands of dollars' damage. A single nip means the ruin of a coffee bean, as the place bitten turns black and makes the berry unsalable. The insect stays in the trees day and night and the remedies tried so far were the gathering by hand by

children at so much per pound and the use of turkeys, which ate the insects when shaken from the trees or such as were within their reach on the lower limbs. Some years ago he had all the banana and other trees and shrubbery cut from the coffee fields, hoping that would serve to discourage the pest. Little result seems to have followed. He now asks very earnestly what he shall do. Knowing little of the life or habits of the insect and nothing of the effect of arsenical or other sprays on the coffee tree, Mr. Caudell did not know what to advise.

Mr. Quaintance suggested that arsenical treatment might be used and Mr. Knab thought sweetened poisoned bait might be of value.

Mr. Schwarz stated that according to Señor Mejia, these Orthoptera appear at the beginning of the rainy season as unwinged specimens and acquire their wings shortly after. It appeared to Mr. Schwarz that oviposition probably is made in the twigs of a tree, as the eggs from dissected females would seem too long to be laid in the stems of weeds; this ought to be ascertained, as it has an important bearing on eventual remedial measures, whether the young specimens are found on weeds or on tall trees used universally in these regions as shade for the coffee trees.

—Mr. Walton said: I wish to announce on behalf of Mr. E. O. G. Kelly, of the Bureau of Entomology, who is now stationed at Wellington, Kansas, that he has apparently settled definitely the old argument as to whether the American members of the genus *Sarcophaga* are truly parasitic or not. During the past summer there has been a severe outbreak of *Melanoplus differentialis* and *Melanoplus bivittatus* in Kansas, which Mr. Kelly has been studying.

In the course of his observations he noticed that when the grasshoppers flew through the air certain flies apparently followed them and darted down at them while on the wing. Upon capturing some of the grasshoppers he discovered tiny maggots attached to the abdomen, watched them enter the grasshopper through the tender spaces between segments, and reared the adult flies from them. I have examined the series of adults sent me for determination, and have been able to

determine one specimen as a male of *Sarcophaga hunteri* Hough. This species happens to be structurally distinct, and, therefore, quite easily determinable. There are, however, at least three species involved in the problem, and in all probability more than three.

Mr. Knab said that the Sarcophagidæ illustrate very well how backward we are in America in some branches of Dipterology. In Europe it has long been known that certain species of Sarcophagidæ are parasitic on other insects; the facts having been established beyond all question, by competent observers. Kunkel d'Herculais, in his studies on injurious locusts (*Stauronotus maroccanus*) in Algeria, made useful investigations and found that certain species of Sarcophagidæ are important parasites of the locusts. The females of these forms have a modified ovipositor and pierce the host to introduce their larvæ, just as is the case with certain Tachinidæ. Lahille, in the Argentine Republic, has shown that certain Sarcophagidæ are parasitic there. Villeneuve has established genera on certain parasitic species. In this country Chittenden has bred a sarcophagid from a live beetle. A scarophagid has also been bred repeatedly in this country from the box-turtle, and this observation has been made so often that the insect involved must be looked upon as a true parasite of the turtle.

—Mr. Caudell presented the followingnotes on *Orchelimum pulchellum:*

On October 2, 1912, at Rosslyn, Virginia, I found near the river a bunch of *Hibiscus militaris* Can., which has very soft wood with a corky pith. The stems were literally filled with the eggs of what I am quite sure is the above species, as many of both sexes were found on the bush, though none of the females were found in the act of egg-laying; the time of oviposition, however, was not past, as I found the females still with eggs. It may have been another species that laid the eggs, but it was more likely the above species. Eggs taken from the abdomen of captured females were very like those taken from the stems. It seems, so far as I can make out from the eggs as placed in the stems studied, that from two to

a dozen eggs are laid in one puncture. The insect appears to sit facing up the stem and when but two or three eggs are laid in one puncture the ovipositor is directed only down the stem, but when several eggs are deposited some are directed towards the base of the stem and some towards the tip, showing that the ovipositor is directed towards the base of the stem part of the time and then towards the tip. I do not know whether the insect withdraws the ovipositor in changing the direction of the puncture.

The eggs are usually placed in the wood, very close under the bark in the larger stems, as shown by the specimens exhibited, but in the smaller stems they are sometimes deposited in the soft inner pith. Green stems seem preferable for purposes of oviposition, but fresh eggs are also found in dead stems.

—Upon request from the chair Professor Parker spoke of his experience with *Cuterebra* in rabbits; he had shot a half-grown rabbit in August in Knox County, Ohio, which had three infestations, one larva already dropped out, another dropped out when he lifted the rabbit up from the ground, and one larva had to be pressed out. In 1907 he had likewise seen full-grown larvæ in a rabbit not more than 2 or 3 months old, which would prove a rapid larval growth of this species, the adult of which appeared in June.

Mr. Knab mentioned that the mature larvæ are frequently received from hunters in the fall. This spring he succeeded in breeding an adult from a larva received last fall. May and June is the normal time of appearance of the fly.

Mr. Walton said he had bred *Cuterebra cuniculi* in Harrisburg, Pa., the fly appearing in June.

Mr. Caudell asked whether the larvæ occurring in rats were of the same species. Mr. Knab answered that he has not seen larvæ of this species and that he was not aware that it had been bred, but as *Cuterebra* seems to be restricted to rodents it is probable that the larvæ in rats are also *Cuterebra*. Probably different species of *Cuterebra* infest different rodents indifferently. One species, *C. emasculator*, has been described from the genitalia of a male squirrel; but he did not think that species was peculiar to the squirrel. Mr. Walton

thought that the *C. emasculator* would prove an exclusive parasite of squirrels and that this is indicated by its smaller size.

—Mr. Barber exhibited specimens of the eggs of *Cicada lyricen* and presented the following notes for publication:

EGGS OF CICADA LYRICEN DEGEER.

By Herbert S. Barber.

The egg-laying habits of the periodical cicada are so well known to everyone that we are too apt to consider its injury as typical of the cicadas. Newell (U. S. Dept. Agr., Bur. Ent. Bull. 60. pp. 52–58) has, however, described the oviposition of a second species, *Cicada erratica* Osb., in the South, but beyond this it seems that nothing on the subject is known of our more common species.

The reference by Smith and Grossbeck (Ent. News, April, 1907, p. 118) to DeGeer's "egg-laying habit of the adult" of his *Cicada lyricen* seems unfortunate in that the eggs he mentions must belong to some other insect. From DeGeer's account (Mem. Hist. d. Insects, vol. 3, 1773, p. 215) one finds that his specimens consisted of adults and pupal skins sent him by M. le Prevots Acrelius from Pennsylvania and New Jersey, with some remarks on the song and egg-laying habit. The reference to the latter, freely translated, is as follows: ". . . the females place their eggs in the forks of the branches and these eggs, which are like white points, are confined in a sort of hard and transparent gum-like mass of the size of a hazlenut." Obviously this refers to the eggs of some other insect, but my own experience does not offer a satisfactory guess at its probable identity.

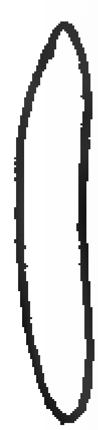

Fig. 2. Eggs of *Cicada lyricen* deGeer. Vertical and lateral view of egg-cluster in incision between wood and bark. Outline of single egg, enlarged.

A female of one of the common cicadas collected at random on Plummers Island, Maryland, was placed in a jar with a hard, dry hickory twig of about one-half inch diameter standing

upright in the sand. A few days later she was found dead, and on close examination two or three very slight indications of punctures were found in the smooth, hard bark. Many clusters of eggs were found by cutting into the bark, but in very few cases could the puncture be detected before the eggs were exposed. These punctures appear to have been closed with a mucilaginous secretion which allows the disturbed and broken fibers of the bark to swell back into their original position before drying, when they are firmly cemented together. In some instances a thin membrane like dried albumen covers the open spaces between the fibers. The incision is a cylindrical cavity 8 mm. long and less than a millimeter wide, parallel to the surface and usually in the inner bark, but often partly in the wood. One incision was found in which the eggs were within the wood itself. The eggs are laid alternately in a double row and usually number 12 or 13. The eggs measure 2.1 to 2.2 mm. in length by 0.35 mm. in width, are subcylindrical, slightly curved; one end tapers more gradually and is more evenly rounded, the other is more bluntly conical.

The identity of the female is somewhat doubtful, but appears from comparison with specimens in the National Museum, and reference to Smith and Grossbeck's paper, to be *Cicada lyricen* DeGeer.[1]

Dr. Hopkins thought these eggs were truly those of the cicada and complimented Mr. Barber on their discovery.

—Mr. Quaintance called attention to injury to walnut leaves and shoots by the walnut curculio, *Conotrachelus juglandis*, and exhibited photographs of the injury. Specimens of injured leaves and shoots have been received the present season from Titusville, Pennsylvania, Upper Marlboro, Maryland, and Stamford, Connecticut. Dr. R. T. Morris, writing of the injury at Stamford, Connecticut, states:

Ordinarly in the vicinity of my country place at Stamford, Conn., this species has confined itself, so far as I know, to the involucre of *J. cinerea;* at least I have never noticed it except there before. When I introduced large numbers of exotic walnut trees this beetle changed its habits, finding a suitable place for depositing its eggs in the rapidly growing herbaceous shoots of the species of Juglandaceæ mentioned (*Juglans regia*, *J. siboldii*, *J. cordiformis*, *J. cinerea*, and *Hicoria minima*). It has practically wiped out one orchard of *J. regia* for me and threatens the industry

[1] This determination has very kindly been confirmed by Mr. W. T. Davis.

so seriously that we probably shall have to give up raising *J. regia* in the East unless some means for control can be found.

The larvæ infest the swollen base of the leaf-stalk and also hollow out the tender shoots. As stated by Dr. Morris, the eggs are deposited in the shoots of various walnut trees from the first week in May until September, and he has noted beetles on the trees as late as October 5.

—Mr. Quaintance exhibited specimens of a chrysomelid beetle, the grubs of which had been complained of as quite injurious to cranberries in one locality in New Jersey. The insect was determined by Mr. Schwarz to be *Rhabdopterus picipes* Oliv. The species has not heretofore been reported as of economic importance, and, in fact, but little is known as to its habits.

The larvæ were present in a cranberry bog in the neighborhood of New Egypt, New Jersey, and had destroyed the plants in small patches here and there over the bog. The injury consists in the destruction of the fibrous roots of the cranberry plant and the eating off of the bark of the larger roots. The injury is very similar to that done by the grape root worm, *Fidia viticida*, to roots of the grape.

Observations made in the cranberry marsh indicate that the beetles feed, to a certain extent at least, on the tender foliage of the cranberry plant, and it is thought possible that advantage might be taken of this fact to secure their destruction by the timely use of arsenical sprays. Beetles confined with cranberry plants in rearing cages in the insectary at Washington fed freely upon the foliage, but spent a good deal of time below the surface of the soil, where they probably oviposit, as eggs were found in the soil.

—Mr. Schwarz remarked that of the multitude of eumolpid Chrysomelidæ which inhabit America hardly anything is known of their natural history or of their range of variation. Even in North America there are genera of which we know very little, for instance the genus *Typophorus*, which includes the strawberry leaf-beetle (now known under the name of *T. canellus* Fabr.). At present all our eastern spotted or black forms are listed as varieties of one species, whereas it is almost

certain that we have several goód species among them. At any rate, the form described by Say as *Colaspis sexsignata*, which is very abundant on juniper (as already stated), never occurring on any other plant and never exhibiting any noteworthy color variations, is certainly a good species. How many species we have among the other forms must be settled by future observations.

The following papers were accepted for publication:

NEW SPECIES OF NOCTUIDÆ FROM THE GUIANAS.

By W. Schaus.

Safia cæruleotincta, sp. n.

Female.—Palpi laterally fuscous brown irrorated with whitish. Frons brown. Vertex and collar dark reddish brown mottled with buff. Thorax dark brown mottled in front with buff; some bluish scales on patagia. Abdomen fuscous brown mottled with some pale scales; a darker transverse shade at base followed by some white irrorations on a dark red-brown shade. Fore wings chiefly dull steel blue; a fine and irregular, vertical, basal, and antemedial line; costa medially shaded with brown; a yellowish-brown shade at end of cell, forming the reniform, and beyond it in angle of postmedial line, which is surmounted on costa by a darker brown spot; a geminate, faint, medial line terminating in a large fuscous spot above inner margin; reniform outwardly edged with fuscous; postmedial outbent on costal margin, dentate and inbent to before reniform, outangled on fold, inwardly edged with brown on inner margin; a dentate whitish line outwardly edges the dark brown costal spot; an outer coarse, brown-black line interrupted at vein 5, dentate between 4 and 3, preceded by a dark shade below vein 2; subterminal dark spots inwardly shaded with light brown, and connected by short streaks to a faint lunular terminal line. Hind wings brown irrorated with dark red; costal margin, streak below cell, and inner margin grayish brown; postmedial and outer line dentate lunular, not reaching costa, the outer line heavily marked towards inner margin, forming two lunules; veins terminally irrorated with blue, especially veins 2–4; subterminal spots as on fore wings; the terminal line more distinct. Wings below dark grayish brown; white shades on cilia at vein 5. Fore wings; some white spots on costa towards apex; a dark postmedial line. Hind wings somewhat paler; a medial and postmedial line; a broad subterminal dark brown shade.

Expanse, 42 mm.

Habitat: St. Jean, Maroni River.

Barydia nigrescens, sp. n.

Male.—Palpi light brown shaded above with fuscous. Head and collar mottled light and dark brown. Thorax paler brown. Abdomen grayish

brown. Fore wings: basal half brown, shaded with gray on inner margin; black basal, subbasal, and geminate antemedial lines on costa, the subcostal partly suffused with black near base; an outangled antemedial black line on inner margin; some darker shading medially on inner margin; a black orbicular point in cell; a dark brown medial shade from costa, black edged and widest on costa, outbent and narrowing to vein 2, suffusing with postmedial line; reniform space whitish mottled with gray and brown, crossed by confused lines, the white extending to costa and inclosing a black and brown spot from which the postmedial originates; this is light brown, vertical, dentate, inbent below reniform, and then outbent to inner margin, and is partly defined by a dark brown line; terminal third of wing steel black; a velvety brown-black subterminal line, oblique to vein 6, inset across vein 5, then outcurved, shaded with dull brown, below vein 3 the line is almost obsolescent, only the dull brown shadings being conspicuous; marginal small black linear spots on interspaces, outwardly edged with white. Hind wings brown shading to black on outer margin, where veins 2–5 are shaded with steel and velvety black; some black and white lines on inner margin above angle, and traces of a similar downbent postmedial line from below vein 5. Wings below grayish brown-termen darker with a broad fuscous brown subterminal shade; a medial and two postmedial dark lines, better defined on hind wings; costa of fore wings postmedially mottled with white; a small black discal spot on hind wings; cilia on hind wings mostly white.

Expanse, 52 mm.

Habitat: St. Jean, Maroni River.

Boryza æraria, sp. n.

Male.—Palpi fuscous tipped with pale brownish gray. Head, collar, and patagia grayish brown, the collar finely edged with white; thorax white shaded with golden bronze. Abdomen dark bluish gray dorsally, shaded with golden bronze at base; laterally paler gray tinged with brown. Fore wings white shaded with pale golden brown; base broadly black shaded with golden brown, not reaching inner margin, though its hind edge forms a slight hook below submedian; a minute brown point as orbicular; a fuscous medial shade on costa, oblique and suffusing with reniform, which is also very oblique, steel black, edged by a fine black line; postmedial line fine, black, shaded with fuscous on costa, outcurved to vein 4, then twice incurved, being outangled on submedian fold; from just above vein 5 to inner margin the line is followed by a more distinct golden brown shade; the subterminal shade suffusing with terminal shadings at vein 5. Hind wings brown tinged with golden; from vein 4 to anal angle the termen is whitish, irrorated with brown, preceded by a clearer white dentate line. Fore wings below and outer margin of hind wings dull grayish brown, the hind wings otherwise somewhat whitish.

Expanse, 39 mm.

Habitat: Omai, British Guiana.
Near *B. commiscens* Wlk.

Orthogramma olivescens, sp. n.

Male.—Palpi dark olive green. Head brown. Body and wings olive buff. Fore wings: some antemedial white scaling on veins; some scattered white irrorations on medial space; a gray-brown medial shade expanding outwardly on subcostal, median, and submedian, not reaching inner margin, crossing in cell the round dark brown orbicular spot; reniform large, dark brown shaded with white in front and behind, also followed by a white shade to line, which is dark brown, fine, outwardly pale edged, and extends from apex to beyond middle of inner margin; an irregular row of small subterminal black and white spots; terminal brown triangular spots. Hind wings: a straight postmedial fine brown; subterminal spots inset on inner margin and slightly larger. Wings below olive brown; dark discal points; a brown postmedial line slightly curved.

Expanse, 39 mm.

Habitat: St. Laurent, Maroni River, French Guiana.

Bendis brevimarginata, sp. n.

Male.—Body dark grayish brown shaded with purple, the patagia in front bright red. Wings purple brown tinged with red; termen finely red; cilia white basally crossed by a red line, terminally olive gray irrorated with white. Fore wings: extreme costa for two-thirds dull olive, edged behind by a white line which expands to extreme costa on outer third and does not quite reach apex; indistinct antemedial and postmedial geminate, darker, wavy lines, marked by white points on inner margin; a faint darker line on discocellular. Hind wings: Costal margin broadly dull dark brown; a medial and postmedial darker line; the anal angle obliquely truncated. Wings below dull brown tinged with purple terminally, broadly at apex of fore wing; a dark postmedial line; cilia brown, crossed by a broad white line.

Expanse, 37 mm.

Habitat: Rockstone, British Guiana.

Tyrissa bellula, sp. n.

Female.—Palpi mottled brown and grayish buff. Head brown, vertex mottled with gray. Collar crossed by a velvety black line. Thorax whitish irrorated with brown. Abdomen pale brown with white segmental lines. Fore wings white, shaded and irrorated with grayish brown, the costa arched antemedially, incurved postmedially; basal line reduced to angled spots on costa and median; antemedial defined by shadings, forming an angled white line on costa, and an incurved line below cell, with a short dark streak in cell followed by the orbicular white point; a small black spot follows antemedial below cell; medial line fine, dark brown, outangled on subcostal; markings on discocellular very confused, forming a horizontal narrow oval spot in front, and a small dark-edged spot behind; postmedial fine from vein 8, deeply lunular beyond cell, crossed by a black line below 6, outset below 5, and wavily oblique to inner margin near

medial line; a subterminal line deeply dentate below apex, inbent below vein 5; termen narrowly dark grayish, expanding between veins 4 and 5, and from vein 2 to tornus; terminal black spots. Hind wings more heavily and darker shaded; the base and costa to postmedial narrowly whitish; the antemedial shade with a small white spot, and an irregular white line, medial line wavy, distinct, followed by a fainter line; the postmedial distinct, geminate, approximating medial line between veins 5 and 6; space beyond more uniformly brown; a distinct outer and subterminal line, the space between them shaded with white; terminal line interrupted. Wings below buff, shaded with brown. Fore wings: costa whitish; an orbicular white point; medial line fine, black, wavy, angled at discocellular; the subterminal angled line inwardly shaded with velvety black-brown between veins 8 and 5, followed by a similar shade at tornus. Hind wings: the inner margin alone whitish; the subterminal shade heavily black brown; medial and postmedial lines finely wavy.

Expanse, 29 mm.

Habitat: Cayenne, French Guiana.

Tyrissa abscisa, sp. n.

Male.—Palpi laterally dark brown. Frons dark brown; vertex and collar brown mottled with gray, the collar edged behind with buff. Thorax, abdomen, and wings yellowish buff; abdomen with narrow transverse fuscous shadings. Fore wings: pale brown shadings along subcostal to apex, and from inner margin obliquely towards termen; some scattered brown-black irrorations form an interrupted outcurved antemedial line, and there are a few similar scales at base of costa and submedian; from middle of inner margin a broader darker brown shade extends towards termen near apex, followed by a finer brown line, inbent towards costa beyond cell; a partly geminate darker brown line from inner margin before tornus to termen at vein 4; the darker brown shades are partly irrorated with brown-black scales; some black scales at end of cell, a margiual fuscous spot between veins 6 and 7. Hind wings: a dark antemedial fascia; a fine medial line followed by a small white discal spot edged with black; a postmedial line of dark scales; an outer straight brown fascia beyond which the outer margin is grayish brown mottled with black, and crossed by some lunular subterminal whitish spots. Wings below whitish, the fore wings shaded with pale yellowish brown; fuscous irrorations forming a broken antemedial line. Fore wings: some medial and subterminal irrorations on inner margin; a small round spot at end of cell, containing a white point; a small terminal black spot near apex. Hind wings: a black discal spot, and fine medial and postmedial lines; a broad subterminal fuscous shade irrorated with whitish.

Expanse, 20 mm.

Habitat: Geldersland, Surinam.

Freilla alastor, sp. n.

Male.—Palpi whitish buff, second joint laterally brown, the third joint with a brown ring. Body buff white; some brown irrorations on collar; abdomen with a few scattered black scales, and transverse brown shades basally and terminally. Fore wings light brown, the termen whitish buff; the costa at apex gray with the extreme edge black cut by pale points; some fuscous striae and scattered black scales to outer line; costa with dark brown shadings; a fuscous spot at end of cell; outer line fine, dark brown, outbent from costa, incurved from vein 7 to below 4, then inbent to middle of inner margin, when it is preceded by three faint brownish lines; a subterminal reddish brown shade, expanding opposite cell and on inner margin; a terminal interrupted dark-brown line. Hind wings buff white, irrorated with pale brown beyond middle; a macular basal line; three antemedial and a medial brown line, all close together; a small dark brown postmedial spot on costa, followed by a very faint line; subterminal line dark velvety brown from vein 6 to anal angle, very faint above vein 6, terminating in a small dark spot on costa, followed by a paler brown shade from apex to anal angle, this shade expanding to projection at vein 7; termen below vein 5 shaded with gray, and with some fuscous striæ; an interrupted terminal fuscous brown line. Wings below buff white, the forewings shaded with brown with some scattered black scales, and fuscous striæ on costa; also orbicular black point, black edged reniform, a fine interrupted postmedial line, black subterminal point between veins 5 and 6, and geminate black lines on inner margin near tornus. Hind wings with outer margin broadly fuscous, the termen narrowly buff white.

Expanse, 25 mm.

Habitat: Cayenne, French Guiana.

Freilla abjecta, sp. n.

Male.—Head, collar, and thorax pale brown. Abdomen pale buff with some dark-brown irrorations. Wings pale buff thinly irrorated with dark brown; a fine terminal dark line partly punctiform. Fore wings: a fine, indistinct, dark antemedial line, incurved across cell; orbicular a fuscous-edged white point; reniform round, black irrorated with gray; a broad pale brown postmedial shade, darkest on inner margin, outcurved around cell, its outer edge defined by a fine wavy lunular line; a faint subterminal line, somewhat punctiform, but thick, black, from veins 7–4, where it is followed to termen by a fuscous gray shade. Hind wings; two small black spots on discocellular; postmedial brown shade downturned and narrowing to anal angle, its outer edge defined by a darker line; subterminal shade brown, marked by some black points; termen shaded with gray. Wings below buff brown with darker irrorations. Fore wings: a black orbicular, and white reniform point, postmedial line finely lunular; sub-

terminal punctiform. Hind wings: the postmedial shade broader, outwardly edged by a lunular line.

Expanse, 25 mm.

Habitat: Rockstone, Essequibo River.

Freilla abluta, sp. n.

Male.—Palpi outwardly brown, inwardly, and tips of second and third joints buff white. Head and thorax pale buff, the collar narrowly velvety black in front and then brown, but broadly pale buff behind. Abdomen slightly darker with broad transverse dull gray shades, and some black and brown irrorations. Wings pale buff, with some scattered dark irrorations; terminal dark-brown points. Fore wings: some dark striæ on costa; traces of an antemedial outangled brownish line; a fuscous spot irrorated with gray at end of cell; a faint postmedial line, outangled beyond cell, and inbent to middle of inner margin, followed by three similar lines only visible from below vein 3; a faint outer, indistinct line, outwardly paler edged, lunular, marked by small dark brown spots on interspaces; termen shaded with brownish gray at tornus, and between veins 4 and 8. Hind wings: antemedial dark points on inner margin; three fine medial dark-brown lines, followed by five pale lines, the fourth of these with some small black-brown spots; a subterminal brownish shade from below apex to anal angle, darker spotted, beyond which the termen is faintly shaded with gray. Wings below whitish buff, the fore wing shaded with pale reddish brown; an irregular outer fine fuscous line; fore wings with darker striæ on costal and inner margins; traces of an antemedial shade, a black point in cell, and a small spot at end of cell; hind wings with discal point, and geminate medial line.

Expanse, 28 mm.

Habitat: Cayenne, French Guiana.

A NEW ULOPHORA FROM FLORIDA.

(Lepidoptera, Pyralidae)

BY HARRISON G. DYAR.

Ulophora caricæ, new species.

Fore wings gray, whitish over the disk; a broad line of raised black scales near the base; a broad pale ocherous band beyond, oblique, followed by a faint reddish line; median space gray, whitish beyond of cell, discal dot double, very small and faint; outer line slightly excurved mesially and denticulate, double, reddish, followed by a dark purplish shade, which fills all the terminal space and is intensified at apex. Hind wing sordid whitish, gray at tip. Expanse, 17 mm.

Cotypes: Male and female, No. 15428, U. S. National Museum, Miami, Florida. Bred from larvæ on papaya. December 2, 1912 (W. W. Yothers).

A NEW INJURIOUS PLUTELLA.

BY AUGUST BUSCK.

Plutella armoraciæ, new species.

Labial palpi ochreous white with a longitudinal, dark golden-yellow streak on the tuft of the second joint exteriorly. Face and crown of head chalky white; sides of the head yellow. Thorax white; patagina yellow. Fore wings light saffron yellow with costal edge narrowly white and with a series of single deep black scales along the dorsal and terminal margin to apex. Cilia whitish yellow. Hind wings silvery white with light fuscous edges and light yellow cilia. Abdomen ochreous white above; entire body white below. Legs white, with the numerous short spines on the underside of the tarsal joints deep black, contrasting conspicuously with the light color of the legs.

Alar expanse, 16 to 18 mm.

Food plant: Horse-radish (bred by Mr. H. O. March).

Habitat: Rocky Ford, Colorado.

Type: No. 15388, U. S. National Museum.

Intermediate between *P. omissa* Walsingham and *P. porrectella* Linnæus, but amply distinct from either; differing in the yellow color and the marginal spots from the former; and differing in the lack of wing ornamentation otherwise from *P. porrectella*.

The injury caused by this species to horse-radish in Colorado is of some economic importance and the present description is published at this time in order to provide a name for it in a forthcoming publication of the Bureau of Entomology, U. S. Department of Agriculture.

BLOOD-SUCKING INSECTS AS TRANSMITTERS OF HUMAN DISEASE.

BY FREDERICK KNAB.

In the September number of our Proceedings (pp. 180–181) Dr. C. T. Brues discusses remarks by the writer, made at the meeting of January 4, 1912, and published in our June issue (pp. 79–81), on the association with man of those blood-sucking insects that have proved to be disease-transmitters. It was not my intention to review the entire field of insect transmission of disease, but simply to point out that in the case of insect-borne blood-diseases such association does exist. I aimed to make it clear that my remarks were restricted to diseases caused by parasites requiring alternate hosts. Being aware of the contradictory or seemingly contradictory facts, and appreciating that my remarks were open to some of the

objections raised by Dr. Brues, I wrote a more extended discussion of the subject and touched (too lightly, it now appears) upon the contradictions. This paper appeared in a well-known entomological periodical[1] nearly two months in advance of the discussion criticized and should have come to Dr. Brues's notice. I find it necessary to reply to Dr. Brues's criticism, as he has somewhat confused the subject by introducing the mechanical conveyance of other classes of disease into the discussion. Such diseases very obviously do not depend upon such close association of particular insects and may be acquired in a variety of ways. In the case of true blood-parasites the association is necessary, not only that, as Dr. Brues puts it, transmission may take place, but in order that the host-relation may become established. I am fully aware that it has been experimentally proved that certain blood-diseases can be transmitted mechanically by blood-sucking insects which are not hosts of the disease-producing parasite. In these experiments positive results were only obtained when the partly fed insect was at once transferred to a healthy animal and the bite followed immediately. This combination of circumstances must occur very rarely, if at all, in nature. Even should it occur, the transfer of the parasite will not be, by any means, always effected. In a practical consideration of blood-disease transmission it is certainly a negligable factor.

The case of the African sleeping-sickness requires some explanation, as it is in a different category from those diseases caused by true blood-parasites of man. Here we have to do with a disease caused by hæmatozoans not normally parasites of man. These protozoans are normally the parasites of the wild animals which abound in those parts of Africa; they do not seriously affect their normal hosts, but they become highly pathogenic when introduced into the human circulation. That this is the true condition with sleeping-sickness is now generally recognized. In this respect, then, the parasites of sleeping-sickness differ from most other blood-parasites, that they may become established in a vertebrate host other than their normal one. In the case of most other blood-parasites, as those of malaria, yellow fever, pappataci fever, and filariasis, it has been determined beyond question that they can thrive only in a single vertebrate host. But with trypanosomiasis, as with the diseases just mentioned, the continuance of the disease depends upon the association

[1]Unconsidered factors in disease transmission by blood-sucking insects. Journ. Econ. Ent. vol. 5, pp. 196-200 (April, 1912).

of the two hosts, in this case the tse-tse flies and the vertebrates, and a sufficient abundance of both. That the association between the hosts of trypanosomiasis is not a close one is compensated for by the long period during which the parasites are present in the circulation of the vetebrate host and by the great abundance of these hosts. Furthermore, there is reason to believe that when the habits of the different species of *Glossina* have been carefully studied, specialization of habits along the lines indicated will be found to exist in the species concerned in disease transmission.

A SYNONYMIC NOTE ON THE MYMARIDÆ.

BY A. A. GIRAULT.

Parvulinus Mercet equals *Alaptus* Haliday.

In the *Boletin de la Real Sociedad española de Historia Natural,* Madrid, June, 1912, pp. 332–335, figs. 1–3, Ricardo Garcia Mercet describes the genus *Parvulinus* as new to the family Mymaridæ for the species *P. auranti* Mercet. Unfortunately, the author has been mistaken, for a perusal of the description shows that *Alaptus* Haliday has been redescribed. The species *auranti* is thus an *Alaptus*, and knowing the wide distribution of members of this genus it would not be surprising if it should turn out to be one of the common European species of that genus, for instance, *minimus* of Walker. Thus, the species must be considered at best but doubtfully valid. The figures given of the antenna and wings certainly resemble those appendages in what I have identified as the species *minimus.*

Mercet also probably falls into error concerning the host of his *Alaptus,* since the members of this genus are usually parasitic upon psocid eggs, while Mercet states them to be parasitic upon coccids, merely from the fact that, if I have rightly understood, they were reared from twigs infested by coccids. Now, psocid eggs often occur among colonies of coccids.

In this connection I must again state that the genera of the Mymaridæ are few.

A SYNONYMIC NOTE ON THE TRICHOGRAMMATIDÆ.

BY A. A. GIRAULT.

Jassidophthora Perkins equals *Brachistella* Girault.

R. C. L. Perkins, in Bulletin No. 10, Entomological Series, Experiment Station of the Hawaiian Sugar Planters' Asso-

ciation, Honolulu, 1912, on pages 17 to 19, describes the genus *Jassidophthora* for *J. prima* as new to the family Trichogrammatidæ of the Hymenoptera Chalcidoidea. As I have just completed a paper on the Australian forms of the family, describing a number of new genera, and also because I have in course of publication a new description of the genera of the family, it became necessary to examine at once the status of this new genus of Perkins. Unfortunately, it appears to be the same as my *Brachistella* described in 1911. As I will have fully explained elsewhere, the genera *Brachistella* and *Abbella* are much alike, closely related, differing only in the density of the discal ciliation of the fore wing, and *Jassidophthora* agrees very well with the description of the former.

I am more anxious to come at the truth concerning this new genus, since I have been at fault in the original descriptions of both of my own genera, there being *two* ring-joints, instead of but the *one*, in the antennæ of both. This is also true of *Ittys* Girault. Full details are given elsewhere. The first funicle joint in *Jassidophthora* is doubtless a second ring-joint and the antennae thus agree with those of *Brachistella*. It thus seems necessary to designate *Jassidophthora prima* Perkins, *Brachistella prima* (Perkins), a species which appears to be valid. Perkins has, I think, been misled in thi case by my own errors.

NEW MEXICAN ACROLOPHIDÆ.

By August Busck.

The following new species are part of extensive collections of Lepidoptera, received for determination from Mr. R. Müller, of Mexico City.

Acrolophus fervidus, new species.

Labial palpi erect, reaching just beyond vertex, loosely haired, light ochreous with dark brown base. Antennæ short, stout, light ochreous. Head and thorax reddish ochreous; patagina light ochreous with a reddish brown longitudinal stripe. Forewings whitish ochreous, heavily overlaid with bright reddish-brown scales, especially on basal two-thirds; on the middle of the wing from base to lower corner of the cell is a broad unmottled whitish streak, edged above and below with dark brown; above this is a black longitudinal line from the middle to the end of the cell terminating in a small black spot; veins 2 to 5 are indistinctly traced by dark brown lines; cilia with alternate whitish ochreous and reddish-brown tufts. Hind wings of a rich dark brown color with light ocherous cilia.

Abdomen blackish brown above; dusky ochreous below; anal tuft ochreous. Legs clothed with mixed ochreous reddish and black hairs.

Alar expanse, 28 to 32 mm.

Habitat: Orizaba, Mexico, R. Müller, collector. June.

Type: No. 15419, U. S. National Museum.

In the National Museum is also a large series of this species from Sixola River and Turialba, Costa Rica, William Schaus, collector.

Acrolophus directus, new species.

Labial palpi very short, reaching only to the middle of the face, porrected, clothed with long black and gray hairs. Antennæ short, thin, simple. Head and thorax long-haired, woolly, gray. Fore wings light gray with the veins faintly outlined with ochreous scales and dotted with equidistant single blackish-brown scales; costal edge with series of small equidistant blackish dots; across the end of the cell is a bold heavy blackish-brown oblique streak. Cilia light gray. Hind wing light bluish fuscous with somewhat lighter cilia. Abodmen and legs gray.

Alar expanse: 30 mm.

Habitat: Mexico City, Mexico, June, R. Müller, collector.

Type: No. 15420, U. S. National Museum.

Acrolophus modestus, new species.

Labial palpi porrected or even deflected, rather short for the genus, light ochreous mottled with black and brown. Head and thorax ochreous gray mottled with black. Fore wings dark fuscous with indistinct and ill-defined lighter longitudinal streaks; costal edge light ochreous fuscous with equidistant dark fuscous dots; on the middle of the wing near base and along the fold are scattered single bluish-black scales; on the middle of the fold is a faint triangular dark brown spot; terminal area deep brown, edged with a faint, oblique, straight row of single, bluish-black scales from apex toward the end of the fold, beyond which row is a light ochreous fuscous area. Cilia with alternate light ochreous and dark fuscous tufts. Hind wings dark fuscous, with cilia a shade lighter. Abdomen dark fuscous; legs dirty ochreous with faint dark brown tarsal annulations.

Alar expanse, 32 to 36 mm.

Habitat: Tehuacan, Mexico, June, July, R. Müller, collector.

Type: No. 15421, U. S. National Museum.

Acrolophus icarus, new species.

Labial palpi long, recurved, plumose, reaching beyond thorax, whitish gray mixed and tipped with bluish black. Head and thorax dirty white mottled with light brown. Fore wings white, closely overlaid with light brown, ochreous, and black scales so as to make the impression of light gray to the unaided eye; on the middle of the wing is an ill-defined and

inconspicuous, longitudinal, zigzag, ocherous band, edged with irregular groups of bluish black scales, most conspicuous on the cell, but faintly continued to apex; on the costal edge is a row of small, faint, equidistant, blackish spots; cilia light gray, mottled with light brown. Hind wings light fuscous with whitish fuscous cilia. Abdomen dark gray with ochreous anal tuft. Legs gray; tarsi annulated with black.

Alar expanse, 22 mm.

Habitat: Tehuacan, Mexico, August–November, R. Müller, collector.

Type: No. 15422, U. S. National Museum.

Acrolophus barbipalpus, new species.

Labial palpi long, erect, reaching well beyond vertex with compressed tuft of long yellow and black hair throughout. Head and thorax with long, matted, light ochreous, black tipped hairs. Fore wings light ochreous, mottled by irregular, heavy, transverse strigulation of dark brown and black; on the costal edge is a series of equidistant, black dashes, continued around apex and along terminal edge as a row of short, black lines; a deep black, interrupted line on the fold; cilia with alternating, light-ocherous and dark-brown tufts. Hind wings dark fuscous with narrow blackish edge; cilia light fuscous with narrow light-ocherous basal line. Abdomen and legs dark fuscous; tarsi with black annulations.

Alar expnase, 22 to 24 mm.

Habitat: Tehuacan, Mexico, June, R. Müller, collector.

Type: No. 15423, U. S. National Museum.

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PROCEEDINGS

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OF

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Antennæ long, basal joint more than twice the length of the second, third joint slender and four times as long as the apical joint.

Pronotum narrowing anteriorly, finely punctured, at the disk feebly convex and the transverse depression behind very faint; humeri broadly thickened; the triangular posterior portion of pronotum somewhat depressed, pointed at apex; the three carinæ feebly raised; the lateral membranous margins of pronotum straight, not rounded, anteriorly rectangular, with two and three rows of small areoles; hood small with rows of minute cells, a little depressed at the sides, in front nearly triangular, behind obtusely rounded, at top a sharp carina with its apex projecting nearly in an upright position.

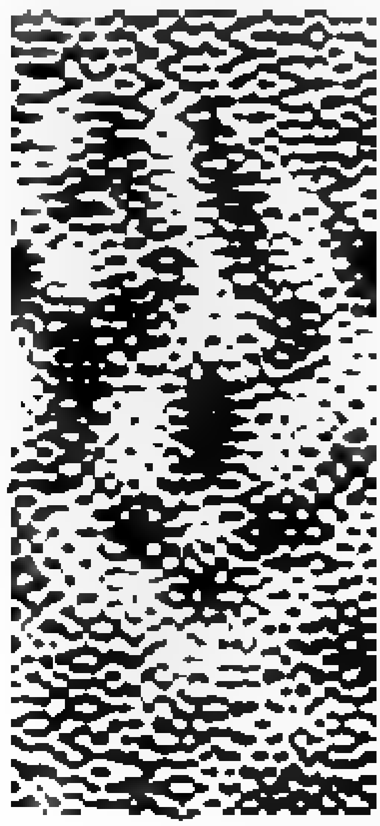


Fig. 1. *Leptodictya plana* Heidemann.

Elytra narrow and long, the sides feebly rounded, apical part obtusely shaped, discoidal area reticulate, long, fusiform, extending as far as the apex of abdomen, bounded by two prominent longitudinal nervures, a blackish narrow streak passes obliquely over the discoidal area in the direction of the outer nervure without touching the same; the subcostal margins very narrow, biseriate throughout; costal margins hardly broader than the discoidal area, irregularly netted, the cells rather small; some cross-nervures at the sutural area infuscated. The lateral expanded margins of pronotum and the head yellowish; surface of the thorax with the triangular prolongation somewhat greenish-gray; abdomen light brown.

Length, 3.2 mm.; width across the widest part of elytra, 1.2 mm.

Described from a single male specimen. Wistar, Indian Territory, July 3 (H. S. Barber).

Type: No. 15326, U. S. National Museum.

This species resembles in general appearance the Mexican species *Leptodictya tabida* H. Schaeffer. It has the same straight, membranous, lateral margins and the three linear carinæ of the pronotum; but otherwise it is quite different in being distinctly narrower across the elytra and the pronotal lateral margins are more opaque, the cells somewhat smaller and the veins less prominent; besides, the spines in front of head do not project beyond the second antennal joint. The young brood and foodplant are still unknown.

Leptodictya simulans, new species.

Body oval-elongate, flat and brownish. Head with five short, whitish spines; the three in front stick close together, making it appear as if there were only one thick, blunt spine; bucculæ somewhat convexly rounded, finely reticulated. Antennæ moderately long; basal joint subequal in length with the terminal, both black; the second half as long as the first and dark brown. Eyes black, rather prominent. Pronotum grayish-yellow, finely punctured, with three low whitish carinæ; the neck blackish; lateral margins of pronotum distinctly rounded, opaque, yellowish-white, and with two or three rows of areoles. The hood longer than broad, not covering the head, yellowish-white with rows of small areoles, the crest sharply carinate. Elytra oval-shaped, transparent, yellowish-white, strongly iridescent; lateral margins from the base to the apical part very feebly rounded but at the apex broadly rounded; discoidal area narrow and long, extending to the middle of elytra, the surface of the area a little concave, finely reticulated and with a conspicuous black narrow streak, which runs diagonally from the inner margin of the nervure toward the outer one, dividing the discoidal area into two parts; subcostal area with two rows of minute cells; costal margins broadest near the middle, irregularly areolated at the base, the areoles small, gradually becoming larger toward the apex, veins sometimes more or less infuscated, except at the inner part of the costal margins.

FIG. 2. *Leptodictya simulans* Heidemann.

Length, 3 mm.; width across the middle of elytra, 1.4 mm.

Described from several specimens, male and females: Old Point Comfort, Virginia, April 19, 1891 (E. A. Schwarz); Drummond, Virginia, June 7, 1905 (H. S. Barber); Alabama, (C. F. Baker); Clemson College, South Carolina (G. G. Ainslie).

Type; No. 15327, U. S. National Museum.

This North American tingid seems to belong to a group of species which have the membranous lateral margins of pronotum more or less rounded, instead of distinctly straight as in *Leptodictya plana* and *Leptodictya tabida* H. S.

The species is nearest allied to Champion's *Leptodictya cretata* from Guatemala, Central America. However, the North American species can be distinguished at once by a black, narrow streak that divides the discoidal area into two parts; furthermore, our insect is smaller, the areoles of the elytra somewhat irregularly arranged, and some of the nervures more or less infuscated. The

specimens from Old Point Comfort were found on the beach of Chesapeake Bay swept ashore by the waves.

A NEW SCELIONID FROM QUEENSLAND, AUSTRALIA, PARASITIC ON ACRIDIID EGGS, WITH DIAGNOSIS OF AUSTRALIAN SPECIES[1]:

(Hymenoptera; Proctotrypoidea.)

By A. A. Girault.

Family Scelionidae.

Subfamily Scelioninae.

Genus SCELIO Latreille.

1. Scelio ovi, new species.

Normal position.

Female.—Length, 4 mm. more or less.

The same in all respects to *Scelio australis* Froggatt, but the scape, pedicel, and sometimes the first funicle joint of the antenna are reddish-brown like the legs instead of being black: also the venation differs in that the stigmal vein of *australis* is somewhat shorter, straight but at its extreme tip bent: this vein in *ovi*, however, is longer, its whole length slightly convexly curved, the convexity distad; the blunted end of the vein in *australis* points proximo-caudad; in *ovi*, the extreme end of the vein has a slight blunted appearance which is turned slightly distad. The wing fumation also differs in that there is a distinct stigmal spot in *australis*, round and covering the basal half of the stigmal vein and the apex of the marginal, while in *ovi* the spot is elongate, does not involve the marginal vein, though originating at the base of the stigmal, but follows the latter on each side for a half, two-thirds, or sometimes, its whole length; it is thus less clear cut than in *australis*. The sculpture of both species is practically the same; ventrad, the proximal half of the second (first body) segment of the abdomen is punctate; the striations of the same segment dorsad are coarser than that of the following segments; the metathorax at the mesial region is sulcate, the sulci with transverse divisions; laterad, in the dorsal aspect it is densely punctate and covered with whitish pubescence. This refers to both species. The antennæ are 12-jointed. The coxæ are darker, the mandibles bidentate, the teeth acute; the proximal funicle joint is always suffused with brownish (*ovi*).

[1] Contribution No. 1 from the Entomological Laboratory of the Sugar Experiment Stations of Queensland, Mackay.

From the species *choetoicetes* Froggatt, *ovi* differs in having the proximal funicle joint of the antenna red, the wings darker and all the abdominal segments in the dorsal aspect longitudinally striate; also probably in venation, but the description does not allow comparison.

From 15 specimens, 2-3 inch objective, 1-inch optic, Bausch & Lomb.

Male.—The same, but differing in abdominal and antennal characters. Thus, the abdomen is blunt at extreme apex; the antennæ are 10-jointed, less compressed fusiform, but the middle of the flagellum widest; the first funicle joint is not so long and the following joints not so wide; the scape and pedicel are nearly black, the first three funicle joints with more brownish but still dark, the remaining joints reddish-brown like the legs. Antennæ with very fine, close white pubescence. Joint 3 of funicle widest, cup-shaped, the second joint intermediate in length between the first and third.

From two specimens, the same magnification.

Described from 15 female and 2 male specimens reared from an acridiid egg-mass found in alluvial soil in a cane field adjoining the Mulgrave River at Nelson (Cairns), North Queensland, April 8 to 10, 1912; also 2 females captured on the surface of the ground along a bare strip in a paddock or meadow near acridiid egg-masses; the same general locality, dark compact soil, April 19, 1912. The first eggs mentioned were most likely those of *Locusta danica* Linnæus, which has been very numerous at Nelson the past several months, but *Locusta australis* has also been mixed in with it to a certain extent.

Subsequently the following specimens were found in my collections: Five females captured from the surface of the ground along a road, April 29, 1912; a female June 10, 1912, at light in the evening at a private residence; a pair taken by sweeping in a forest at Nelson, February 16, 1912; a female similarly captured, January 29, 1912; three males captured with a female of *australis* from the ground in a meadow, Nelson, June, 6, 1912; and a female from the ground among the young of *danica,* May 6, 1912.

Habitat: Australia—North Queensland, East Coast (Cairns District).

Types: No. *Hy / 989*, Queensland Museum, Brisbane, 2 males 2 females, tag mounted.

Cotypes: Catalogue No. 15250, U. S. National Museum, Washington, D. C., 4 females remounted on tags from alcohol.

2. Scelio australis Froggatt.

Scelio australis Froggatt, 1910, Farmer's Bulletin No. 29, Department of Agriculture, New South Wales, Sydney, pp. 34-35, figures 1, 1*a*.

This species was described from the Herbert River, Queensland, from specimens reared from the eggs of *Locusta australia*. In a forest near Nelson, North Queensland, I captured a male and a female specimen of this species by sweeping grass, April 19, 1912. Its original description does not give all the necessary specific characters which I have noted in foregoing. Thus, for this genus, in order to describe species recognizably it is necessary to give not only the sculpturing in detail, but also the degree of wing fumation, the shape of the stigmal spot, the details of the venation and those of coloration. A variation in the coloring of the antenna seems to be correlated with a variation in the venation. Of itself, I think one would hesitate to consider a species of this genus distinct did it differ from another only in the fact that the first two or three antennal joints were of a different color, since a variation of this kind would be expected to occur with many of the species.

I describe the male herewith:

Like the female, but differing in the following characters: The antennæ are as in the male of *ovi*, but differ in coloration in that they are brown at base, only the first two funicle joints and the pedicel being darker brownish and the tip of the scape blackish; they are alike structurally. One male specimen, captured later, was only two-thirds the size of the others. Later, I found *australis* common at Nelson, usually accompanying *ovi*. The following specimens were captured: Two females, four males from surface of the ground in a meadow, May 18, 1912; a female June 6 in the same place; three females on the ground along a road, April 29, 1912; two females May 6, on the ground mingled with young *danica* and finally two females from the ground, along the grassy borders of a tram-line at Nelson, mingled with the young of *danica*, May 18, 1912.

In the original description of *australis*, Froggatt (loc. cit. p. 34, ¶ 7) seems to have made a mistake in this statement: "the thoracic segments, which are well defined, are thickly marked with fine parallel striæ on the undersurface; these striæ are shorter, as there is a smooth shining patch at the junction of each segment." The abdomen was doubtless in mind, since the ventral thorax is like the dorsal, the abdomen striate in my specimens, while both the figure of Froggatt and his statements to me in a letter bear this out.

3. **Scelio froggatti** Crawford.

This species was described in the Proceedings of the United States National Museum (Washington, D. C., U. S. A.), vol. 41, 1911, from Childers, Queensland. On December 24, 1911, while sweeping along the floor of a forest on the coast of North Queens-

land, opposite Double Island (10 or more miles north of Cairns) I captured a male *Scelio* which is undoubtedly this species. It is both like *ovi* and *australis*, but the striation along the dorsal and ventral aspects of the abdominal segments is rugolose, the striæ curved and interlacing around punctures and hence shorter and not nearly parallel; the antennæ in this specimen are wholly honey-yellow, but otherwise like those of the males of *ovi*. The strong striæ converging toward the mouth are conspicuous; the proximal tarsal joint in the posterior legs is decidedly shorter than with either *ovi* or *australis*, and the size is smaller (at least with this specimen). The parapsidal furrows distinguishable, as distinct as in the other species noted (*ovi* and *australis*).

There are six species of the genus now known from Australia, all parasitic upon acridiid eggs. I give herewith a diagnosis of them, constructed from the literature and the foregoing specimens. The three species occurring in Queensland are distinct from the three known from New South Wales and this is expected from the difference in latitude.

KEY TO THE FEMALES OF THE AUSTRALIAN SPECIES OF SCELIO LATREILLE.

Black, the legs reddish brown or yellow, the fore wings infuscated.

I. Head smooth, polished, with a few scattered, fine punctures or a few converging striae.

Scape, pedicel, and at least first two or three joints of funicle fulvous; segments 1 and 2 of abdomen longitudinally striate, segment 3 finely reticulate, segment 4 with similar sculpture at base, the succeeding segments hardly sculptured; ventral segment 3 of abdomen with punctures on each side of meson and segment 4 with the same punctures but covering a smaller space. Face without striæ *pulchellus* Crawford

Scape, pedicel, proximal and apical funicle joints fulvous; abdominal segments all finely, longitudinally striate, but the fifth segment with a median smooth area and ventrad the segments all having the middle of each smooth; face with some striæ; abdomen dark brown................*fulgidus* Crawford

II. Head rough, rugose or rugoso-punctate for a large part, especially at the vertex.

(1) Abdomen wholly longitudinally striate or rugulose, dorsad and ventrad, except maybe medially and at the incisions of the segments.

Abdomen longitudinally striate; parapsidal furrows distinct.

Antennæ wholly black.
Stigmal vein straight but bent at its extreme tip, the blunted end pointing proximo-caudad. Stigmal spot distinct, round, covering basal half of stigmal vein and apex of marginal....... *australis* Froggatt
Antennæ black with the scape, pedicel, and, usually, the first funicle joint reddish-brown.
Stigmal vein slightly, convexly curved along its whole length, the tip very slightly turned distad. Stigmal spot elongate, not involving the marginal vein.. *ovi* Girault
Abdomen longitudinally rugulose.
Antennæ wholly dark brown; parapsidal furrows more or less obliterated.................. *froggatti* Crawford
(2) Abdomen only partly longitudinally striate, some of the segments finely punctate in the dorsal aspect.
Segments 3, 4, and 5 of the abdomen covered with fine, close, shallow punctures, giving them a shagreened appearance; fore wings lighter than usual; scape and pedicel of antennæ reddish brown. Beneath, abdomen finely longitudinally striate............................ *chortoicetes* Froggatt

Summary of the Hosts of Scelio Latreille in Australia.

Species.	Host.	Authority.
australis Froggatt......	*Locusta australis* Brunner, v. W................	Froggatt, *l. c.*, p. 35.
chortoicetes Froggatt....	*Chortoicetes terminifera* Walker................	Froggatt, *l. c.*, p. 36
froggatti Crawford......	*Gastrinagus musicus* Fabricius.[1]...............	Frogatt, *in litt.*, Mav 6 1912.
fulgidus Crawford......	*Chortoicetes terminifera* Walker................ (given as *Pachytylus australis*)	Crawford, *l. c.*
ovi Girault.............	*Locusta danica* Linnæus.......................	See above.
pulchellus Crawford....	*Chortoicetes pusilla* Walker.....................	Crawford, *l.c.*

[1] From what I can gather this appears to be a synonym of *Locusta danica* Linn. In the original description of the parasite, Crawford gave by mistake (as Mr. Froggatt informed me by letter) *Chortoicetes terminifera* as the host.

Though so far removed from the scene of actions of other species of the genus, yet the habits are the same in Australia as in North America, for instance.

I have to thank Mr. Walter W. Froggatt, Government Entomologist, New South Wales, for his kindness in furnishing me with Crawford's descriptions of the species of the genus and for a few facts in connection with hosts as noted.

CRITICAL NOTES ON SOME SPECIES OF MYMARIDÆ FROM THE SANDWICH (HAWAIIAN) ISLANDS, WITH COMPARATIVE NOTES ON AUSTRALIAN, NORTH AMERICAN, AND EUROPEAN FORMS.

(Hymenoptera; Chalcidoidea.)

By A. A. Girault.

I have recently obtained a few specimens of Mymaridæ from the Sandwich Islands through the kindness of Mr. Otto H. Swezey, all of the genus *Polynema* Haliday; also I have captured in Northern Queenlsand and in Fiji one or two species of the family common also to these islands and in one case to North America. The Myrmaridæ of Australia also, now, are tolerably well known to me. Inasmuch as the Sandwich Islands are situated in a position geographically between North America, Fiji, and Australia, it is interesting from the standpoint of geographical distribution of animals to make this comparison, since it will be shown as probable that most of the indigenous forms of the family occurring in Hawaii, North America, and Australia (also Europe) are quite peculiar to those continents, fulfilling our expectations. It is also shown probable that such species as are common to several of the continents or islands have been distributed through commerce or else are parasitic upon widely distributed species or genera or families of insects. I make the detailed comparisons herewith.

Subfamily GONATOCERINÆ.

Genus ALAPTUS Haliday.

1. Alaptus immaturus Perkins.

Perkins described this species in 1905 from Bundaberg, Queensland, Australia, it having been reared from leaves of sugar cane infested with leaf-hopper eggs, but these latter were doubtfully the host. In the second volume (part VI) of the Fauna Hawaiiensis, Cambridge, England (1910, p. 661), the same author records the species from the Sandwich Islands, "Oahu and probably all the islands; bred from the eggs of Psocidæ." But previously, also in the introduction to the bulletin containing the original description of the insect, on page xxiv, it was stated in regard to its host: "Eggs of Psocid feeding on fungus growing on honeydew excreted by leaf-hoppers." Thus, the doubtful host implied in the original description was given by mistake, probably, and the host is a psocid, as would be expected. Since, I have captured the species in several localities in North Queensland, once from the foliage

[1] Contribution No. 2, Entomological Laboratory, Sugar Experiment Stations, Mackay, Queensland.

of citron growing wild near the jungle, but which was imported and planted by a settler some years ago. I have compared the species with others of the genus in a paper on Australian Mymaridæ now in manuscript and it should suffice to say that it is a good species, but a typical one of the genus, there being no peculiarities which may be connected in any way with its habitat.

The occurrence of this species in the Sandwich Islands would appear rather remarkable to me did I not have reason to think that it was introduced there with the other Australian parasites of sugar-cane insects, as described in Bulletin No. 1 of the Hawaiian Sugar Planters' Association. No direct statement is made to that effect, but it seems very probable. If it was not intentionally introduced, then its presence can be explained by the fact that it is associated with commercial plants such as sugar cane and citrus fruits and was distributed by commerce. These explanations are the most likely and reasonable ones, for otherwise we would have to accept others which in this case would be not incredible, but less reasonable in the face of the first two. The species most probably is native to the east coast of Australia.

2. Alaptus globosicornis Girault.

This species was described from Florida in North America. It was recorded to have been reared from a coccid on citrus fruits in 1907. About three years later Girault recorded it from Honolulu, in the Sandwich Islands, where it had been captured in an office as early as 1900. It was thus found earlier in the Pacific than in North America. Late in 1911 and early in 1912 I captured a number of specimens of it in North Queensland, where it appears to be the commonest species of the genus, but forms what appears to be a distant color variety; the Hawaiian specimen also appears to be a similarly distinct variety. In Queensland the species was found only in settled areas where citrus fruits are not uncommon; in the Sandwich Islands the office where the species was captured was very probably an insectary or an entomological or quarantine office where imported insects and trees would likely be placed for a time. Thus, again, I think the explanation of the wide distribution of this species is that of commercial dispersal, the parasite being carried along with its host. This seems the most likely. The fact that the species is split into geographical varieties would tend to show that it has been distributed over its present-known range for some time, but a variation of this kind, namely, of general body coloration, does not necessarily have to have a long period of time for its consummation, but, I believe it is known, may ensue after the exposure of a comparatively small number of generations to the new climate. The species is a characteristic one, because of the submoniliform

antennal funicle, but it is as peculiar in its relation to North America and European species as it is to those of Australia.

Genus LEIMACIS Foerster.

A species of this genus (*peregrina* Perkins) has been described from Honolulu and I have an Australian species captured in North Queensland; the two species are distinct, since they differ in general coloration and markedly in the ciliation of the forewing and length of the antennal club.

SUBFAMILY MYMARINÆ.

Genus ANAGRUS Haliday.

1. Anagrus armatus (Ashmead).

In my paper on Austrialian Mymaridæ, mentioned previously, I will give evidence that this species is common to North America, the Sandwich Islands, the Fijian Islands, and to Australia. The matter need not be gone into here, but I desire merely to account for its occurrence in these widely separated countries. The species was first described from Florida in North America, more than twenty years ago. Recently, I showed that it was very common in North America, and the evidence which I will present in the paper referred to shows that it is distributed from the east coast of the United States as far west as the Rocky Mountains and is parasitic upon leaf-hopper eggs deposited in the soft parts of various plants, those recorded being the grape and apple (both inferred, since the parasites appeared from twigs of those plants infested with external hosts which are very doubtful hosts of this parasite), an economic *Empoasca* (a definite, unpublished record from host egg in leaves) and from a *Liburnia* on grass; also Perkins records it from *Liburnia* or similar eggs in Australia, the plant doubtless sugar cane, another grass, but no statement is made that it was originally found on that plant. However, Perkins had discussed the parasite as an associate of the sugar cane and introduced it into the Sandwich Islands for the purposes of the economic entomology of that crop.

The above facts, namely, that the species occurs in four widely separated countries and that it is associated with cultivated plants widely transported in commerce, represent effect and cause, since I believe that little or no doubt can be entertained otherwise. The opportunities for the distribution of this insect during the last century from one continent to another by commerce have been enormous, for what plants have been more widely interchanged than the grasses and fruits? There is nothing to contradict this view. This species, also, is very similar to, yet dis-

tinct from, *brocheri* Schulz of Europe. In this connection, Perkins has stated: "*Anagrus* of the Mymaridæ attacks the eggs of the Delphacidæ alike in Europe, America, Australia, Fiji, and China, and even the species hardly differ in these countries."

Subgenus PARANAGRUS Perkins.

1. Paranagrus perforator Perkins.

This species was described from Fiji. It was obtained from the eggs of various genera of delphacid leaf-hoppers, usually in grasses, rarely in sugar cane, and was introduced into the Sandwich Islands in connection with the economic entomology of sugar cane. Its occurrence in those islands is thus accounted for, but just recently I have captured several specimens of it in North Queensland in an area planted with sugar cane and I have no doubt that its presence here is due to introduction with that plant; more than this, however, it may be the same species as *Paranagrus optabilis* Perkins described from Queensland, since the two forms are very much alike, and according to Perkins *optabilis* also occurs in Fiji. The two forms differ only in the presence of an exserted ovipositor in one (*perforator*) "for a length equal to that of all the joints of one of the hind tarsi taken together." But my Queensland specimens of *perforator* have the valves of the ovipositor exserted to an extent somewhat less than that described originally. Both specimens are connected with sugar cane.

Genus POLYNEMA Haliday.

1. Polynema reduvioli Perkins.

Of interest generically because of the lengthened proximal joint of the antennal funicle, this species was described from the Sandwich or Hawaiian Islands, it being parasitic upon leaf-hopper eggs in the leaves of sugar cane. Subsequently, it has been recorded from several islands of the Sandwich group. Mr. Swezey has sent me several specimens of it and I examine them herewith, with special reference to the relations of the species to North American, European and Australian species. As was to be expected, the species is closely related to those species like the type of *Stephanodes* Enock, *Polynema enockii* Girault, *Polynema psecas* Girault—and the lengthened proximal joint of the antennal funicle is correlated in all with the peculiarly broad fore wings bearing very fine discal ciliation and the intense coloration of the yellow part of the body; also the serrated scape. I am the more inclined, since seeing this species, to recognize Enock's *Stephanodes* with at least the rank of a subgenus, but await, before considering this, the comparison of the three and with an Australian form. I still hold back, also, because of the species *bifasciatipenne* Girault,

which has no correlated color nor fore wings, but is peculiar to itself.

At first I take the European species with lengthened proximal funicle joint—(*Stephanodes*) *Polynema enockii* (Girault). The females differ as follows: Funicle joints 4 and 5 are shorter and subequal in *reduvioli* and joint 5 is not nearly as long as joint 3 but distinctly shorter; also the fore wings are not quite so large, more graceful, bearing about 25 lines of fine discal ciliation; otherwise, I can not distinguish the two species; they are remarkably similar; the antennal scape in *reduvioli* bears the peculiar sculpture. The males of *enockii* differ from the males of *reduvioli* in having distinctly longer joints in the flagellum. The coloration of both species is the same. In regard to the North American *psecas*, the Hawaiian species, comparing the females first, differ thus: Only in the fact that the second funicle joint is shorter in relation to the first in the North American species, but in the same species I have seen a specimen where the two joints were subequal; this difference is certainly very small and it is extremely difficult to know what to do in such cases. By comparing the males, it is seen that they differ as in the case of *enockii*, the flagellar joints in *psecas* being distinctly longer. For the present, therefore, I leave the species separate, though they form suspicious units. In one specimen of *psecas*, the second funicle joint was yellow like the first.

On November 4, 1911, I captured a single female *Polynema* from a window around the veranda of a private residence at Kuranda, North Queensland, a locality a few miles distant from the nearest sugar-cane area. This species bore a long proximal funicle joint of the antenna and as expected closely resembled the foregoing species. I now compare it with them. It resembles all but more nearly *enockii* and *reduvioli*, differing from the former in bearing fore wings like the latter; thus, as concerns the antennæ, it is intermediate or nearly between *reduvioli* and *psecas*. From the Hawaiian species I am unable to separate it, so that the species is common to the Sandwich Islands and Australia. From what Perkins states in the original description of his species (*reduvioli*) I have not much doubt but what it is the same as *hawaiiensis* of Ashmead. In the Australian specimen of *reduvioli*, the proximal funicle joint was shorter than usual, but there seems to be considerable variation in this respect, as I have experienced with *psecas*. Hence, the English species is the most distinct, while the North American and Hawaiian forms are very closely allied if not the same.

Here we have specimens of at least two distinct species of *Polynema*, and probably three, occupying an enormous area of the

earth and occurring in very distant countries with greatly different climates; and the two or three are strikingly alike. The climate of North America is vastly different from that of Hawaii or North Queensland, and yet we find forms occurring in all three places that are so much alike as doubtfully representing two species. As concerns the occurrence of the Hawaiian form in Northeast Australia, the explanation again hinges upon commercial distribution, since the species is associated with sugarcane insects in Queensland and the Sandwich Islands. Commerce seems to be accomplishing in a few years what nature takes thousands to do.

I believe it is true in all genera that their species will be found to be more or less clustered in groups, and this seems to be necessary from their nature and the manner of their formation. These clusters of species must be viewed as genera in the making and although it must be conceded that natural genera occur, since it is allowed that species are natural, still from the standpoint of human experience and reason it is extremely difficult to say just where a genus commences and a cluster of allied species ends, just as it is difficult to say when a variety is a species. So we find it in this mymarid genus *Polynema*. There are species grouped according to the width of the fore wings, as *longipes* and its allies and the closely allied group of species including *consobrinum*, *striaticorne*, *regina*, and *euchariforme*. Enock separated one species characterized by a long proximal funicle joint in the antennæ as the distinct genus *Stephanodes;* subsequently other species were found bearing the same character, two or three of them much alike in coloration, the structure of the fore wings, and other appendages and agreeing also in bearing a peculiar sculpture on the scape. But one of them is totally different in the structure of the fore wings and in coloration, and in still other species the peculiar sculpture of the scape occurs without the other correlated characters. This species group seems to be more on the way toward forming a genus, but since it is difficult to say just what the characteristics of the genus will be if the group is raised to that rank, it seems best not to accept the genus. If the long proximal funicle joint is taken as the separating characteristic, with what is it correlated and how long it is necessary for it to be, the species *striaticorne* and *bifasciatipenne* form connecting links between the forms bearing a short proximal funicle joint and those bearing a long one, and although these species have the sculptured scape (only rarely in *striaticorne*), but totally different wings and color, where is the correlation demanded. There are no other characters available as a basis for separation.

The above comparative notes are based upon these specimens: *Polynema enockii* Girault—one male, one female mounted in

balsam, labeled "Burnham Beeches, Eng. 2.6.08, 23.7.08 (male); C. Waterhouse. *Polynema psecas* Girault—Three females (from Illinois, U. S. A., Urbana, April 22, 1909, J. D. Hood; Mattoon, July 16, 1910; from United States National Museum collection, no labels); one male, Mattoon, Illinois, U. S. A., July 16, 1910. *Polynema reduvioli* Perkins—two males, one female remounted from cards in xylol balsam, received from Mr. O. H. Swezey and labeled "Honolulu, Oahu, 7.22.07," males, and "Pahala, Hawaii, 12.2.05," the female. Also a female captured in North Queensland as above noted.

2. **Polynema rubriventre** Perkins.

Mr. Swezey sent me two females of this species collected December 5, 1907 (12-5-07) at Kaumuchona, Oahu, Sandwich Islands, by himself. The specimens were mounted on cards. In order to remount them, these latter were removed from the pin and placed into a vial containing ordinary water. After a short while they had become dissolved from the cards and by gently shaking the vial were made to float freely upon the water. With a camel's-hair brush they were removed and placed upon a slide, upon which, after draining them, they were run through absolute alcohol and chloroform in succession, draining after each operation. Then being floated in chloroform, they were without difficulty removed to a central drop of xylol-balsam, merely by transferring them on the end of an insect pin dipped into the balsam; the balsam was then covered with a cover-glass. Gentle heat was then applied, placing the cover in its place and removing air and the mount was complete. This operation has been described because of the ease and rapidity with which it is performed and also because the mounts are sufficient for the purposes for which intended and no injury is done to the specimens.

Perkins described this species from Oahu from an elevation of 1,500 feet and upward. It is not known to occur elsewhere than Oahu. Its original description agrees with the specimens before me. The characteristic black of the head and thorax and the ferruginous of the abdomen contrast; the legs are intense orange yellow; the valves of the ovipositor are exserted for a distance equal to the length of the distal funicle joint or about somewhat less than a fifth of the length of the abdomen and they are concolorous with the abdomen. The species is a large one, robust, with broad fore wings whose discal ciliation is dense and moderately long, not fine. The longest marginal cilia are only about a fourth the wings' greatest width; the fore wings are somewhat larger than those in the *sibylla* Girault and has distinctly shorter marginal cilia; the fore wings also are distinctly fumated along the distal half of that portion of the blade which is distad of the venation

especially centrally or in the midlongitudinal line; the second funicle joint is the longest joint of the funicle, the third joint also long, twice the length of the moderately slender first joint, which is slightly longer than the pedicel. The distal three joints are all distinctly longer than the proximal joint and all subequal; the scape is not sculptured nor asperate; the club is rather short, stout, ellipsoidal. Marginal vein broad and short. Posterior wings without noticeable midlongitudinal discal ciliation, their cephalic marginal cilia somewhat longer than usual, bearing two lines of discal ciliation along each margin. The species is distinct from any which I have seen, though its fore wings are somewhat like those of the North American *sibylla* and perhaps somewhat like the English *flavipes*, but not much. I have seen no Australian species like it, but I have only two species of the genus which are new species and which appear to be indigenous. The male has never been described.

3. **Polynema terrestre** Perkins.

Described also fom Oahu, Sandwich Islands. This is an enormous species of the genus, being noticeably more robust than the preceding species, *rubriventris*. Mr. Swezey sent me a pair mounted on cards, together with another male of the species mentioned below (*poeta* n. sp.) which was mixed in. The specimens were labeled "*Polynema terrestris* Perkins. Oahu, Kaumuchona, ♀, 12.5.07; Olympus, ♂, 11.21.09. O. H. S." Both specimens were from the island of Oahu.

The original description agrees with the specimens, excepting with the latter the tibiæ of all of the legs and the scape were more or less brown or dusky, the distal funicle joint (and the two preceding ones also) in the female distinctly more than thrice its width, at least five times longer than wide, the club distinctly less than the combined length of the two preceding joints; also, the longest marginal cilia of the fore-wings are distinctly less than half the greatest width of the large fore wings, not more than between a third and fourth as long as the wing is wide. The scape is without sculpture; funicle joints all moderately long, the second very long. The fore wings have a smoky line across them at the marginal vein; the latter is rather long. The fore wings are broad and large, larger than in *rubriventre*, their discal ciliation fine and dense, somewhat as is *reduvioli*, each cilium, however, rather long. The tarsi are noticeably clothed with stiff, short bristles. The cephalic marginal cilia of the posterior wings is distinctly longer than the blade is wide and at tip the blade bears several confused lines of discal ciliation in the midlongitudinal line. The original description of this species is certainly not very explicit and is nearly the same as for the species *gigas*. For all

one may know to the contrary *gigas* may be the same as *terrestris*, since all that we know about it is that the legs are more or less brownish or yellowish. Now species of the genus may easily vary that much, that is, from yellow to brown in the legs and basal antennal joints, and making species on such differences is hazardous, to say the least. Because of such tendency to vary, the descriptions become all the more obscure.

This species differs from any other species known to me, mostly in its enormous size, its large fore wings, which bear almost forty lines of discal ciliation across the wides point, and the long antennal joint, especially the second and third joints of the funicle. It is distinctly larger than *Cosmocomoidea morrilli* Howard, which is a large species for the family. The fore wings are much broader than those of the North American *graculus* and *sibylla*. From the European *flavipes* it differs again in its robustness in body and appendages. The joints of the flagellum in male *terrestris* shorten distad, but the proximal joint is somewhat shorter than the second joint, which is at least six times longer than broad. The shortening becomes noticeable as funicle joint 8. Joints finely striate.

The other male, which as stated was sent with *terrestre* as a specimen of that species, is quite distinct and appears to be undescribed. This case again illustrates how the members of this genus may be alike in color, yet different in structure, and also how careful we must be in dealing with these systematically difficult insects. I describe the species herewith.

4. Polynema poeta new species.

Male.—The same as *terrestre* male, excepting as follows: Decidedly smaller, slightly smaller than *rubriventre* but still large for the genus, measuring about 1.40 mm. The pedicel, scape, abdominal petiole and all of legs except the black distal tarsal joints, chrome yellow, the convex margin of the scape asperate slightly. Joints of the tarsi and of the flagellum all somewhat shorter than in *terrestre*. The fore wings are entirely different, except in the marginal vein. Thus, they are noticeably narrower though of the same shape, while the discal ciliation is coarser and less dense (only about twenty-six lines across the widest portion of the blade), the longest marginal cilia about slightly over a third of the fore wing's greatest width. The thorax apparently without sculpture, the parapsidal furrows distinct, curved, a transverse line of foveæ across the apex of the scutellum, near the margin. Joints of antennal funicle where longest (joints 2–5) at least six or more times longer than wide, the second somewhat longer than the first, which is subequal to joint 6; 7 somewhat shorter than 1, while joints 8–11 are subequal and only about four times longer than wide. The joints are longitudinally striate.

From a single specimen, 2–3 inch objective, 1-inch optic. Bausch & Lomb.

Female.—Not known.

Described from a single male specimen received from Mr. O. H. Swezey as above noted. The species is characterized by the shape, size and ciliation of the fore wings, which are broader than in most species of the genus, resembling those of *sibylla,* nearly, though the marginal cilia in that species are longer.

Habitat: Sandwich Islands—Oahu (Olympus).

Type: Cat. No. 15251, U. S. National Museum, Washington, D. C., the above male (mounted on a slide with a pair of *Polynema terrestre* Perkins).

5. Polynema tantalea Perkins.

The fourth species received from Mr. Swezey is native to the Sandwich Islands and was described form Oahu. It is a large species, but not so large as *terrestre,* to the naked eye appearing intermediate between that species and *rubriventre.* It is characterized as far as other species known to me are concerned by its ferruginous color and clear fore wings, the head black (sometimes in balsam having a metallic greenish tinge, though I doubt the realness of that) and the distal five antennal joints, the distal tarsal joint. I was sent two specimens, but they represent two apparent species, neither of which agree with the description of *tantalea.* A male specimen agrees, however, excepting that the abdomen is black only at tip. Here again is a case where it is impossible to identify with certainty the specimens from the descriptions, since no comparative descriptive notes are given for the species, more especially in regard to the fore wings in which these two species differ. I shall thus consider the male specimen as *tantalea,* since it agrees nearly with the description of that species (its abdomen is obscurely dusky nearly to base, black at tip); the female, however, appears to be undescribed; it differs from *apicalis* in having the third and fourth antennal joints yellow and the wings hyaline, from *perforator* presumably in bearing a shorter club, a shorter proximal funicle joint, shorter marginal cilia of the fore wing, and the yellow third and fourth antennal joints; and from *oahuensis,* a third similar species described by Perkins from Hawaii, in having the four distal joints of the antennæ black, the head all black and shorter marginal cilia of the fore wing. As regards *tantalea* as represented by the male specimen, it differs in having the fore wings less broad, the discal ciliation denser but of about the same quality; thus, the *tantalea* bears about thirty-four lines of the cilia across the widest blade portion, while the other bears about thirty denser lines. The difference is noticeable, but without more material I merely designate this

female specimen as a narrow-winged variety of *tantalea*. I do this with some diffidence, realizing the difficulties, but at the same time remembering that it is the business of systematic entomology to detect these differences and record and interpret them. The male specimen of *tantalea* has the distal joint of the flagellum somewhat shorter than the proximal funicle joint; the joints are finely, longitudinally striate; the line of foveæ on the scutellum is composed of two obliqued straight lines on each side of the meson, meeting at the meson. The line appears to be a broad, convex curve in the variety. In *tantalea* the length of the longest marginal cilia of the fore wing is equal to about a fourth of the wing's greatest width. The caudal marginal cilia of the posterior wing are very long, longer than the longest cilia of the fore wing. The forewings are broader than those of the North American *sibylla*, with shorter marginal fringes.

Polynema tantalea longipenne, new variety.

Female.—Ferruginous, the distal five antennal joints, the distal tarsal joint, the intermediate and posterior tibiæ, the basal portions of the cephalic tibiæ, the marginal vein, and the head black or blackish. Funicle joints 1 and 2 suffused with dusky. Fore wings slightly stained at the distal half of that portion of the blade distad of the venation. Proximal funicle joint subequal in length to the pedicel, not quite half the length of the second joint, which is a fourth longer than the third; funicle joints 4, 5, and 6 subequal, each a fourth shorter than the third and distinctly longer than the first, the club not quite equal in length to the two preceding joints combined. Fore wings nearly as in *Polynema sibylla*, but the marginal cilia are shorter.

Like *tantalea*, except as noted above in regard to its fore wings and probably the foveate line across the scutellum.

Described from a single female specimen received from Mr. Swezey and labeled "*Polynema tantalea* Perkins, Kaumuchona, Oahu, 12.5.07. O. H. S."

Habitat: Sandwich Islands, Oahu (Kaumuchona.)

Type: Cat. No. 15252, U. S. National Museum, Washington, D. C., one female in xylol-balsam (mounted with a male specimen of *tantalea*).

The foregoing male of *tantalea* was collected by Mr. Swezey at Tantalus, Oahu, October 15, 1911.

Thus we have seen four common species of *Polynema* indigenous to Hawaii which are distinct from native North American and Australian species of the genus, so far as is known; also from native European species of the genus so far as my limited knowledge of these latter goes. Also, it has been shown that there is a relation between the species so far known to exist in several continents

and the presence of commercial crop plants with which they have become associated. These facts bear out the conclusion long reached by naturalists that these widely distributed species must once have been confined to their place of origin in some one of the continents now occupied by them so recently.

I may add that *Dicopus psyche*, which I recently described from Fiji, has subsequently been found in North Queensland.

MEETING OF NOVEMBER 7, 1912.

The 262d regular meeting of the Society was entertained by Prof. T. B. Symons and Mr. A. B. Gahan at the Saengerbund Hall, 314 C Street N. W., on the evening of November 7, 1912, and there were present: Messrs. Baker, Barber, Burgess, Busck, Caudell, Cory, Craighead, Crawford, Cushman, Duckett, Fisher, Gahan, Gill, Green, Heidemann, Heinrick, Hopkins, Howard, Johansen, Knab, McAtee, Marshall, Middleton, Myers, Quaintance, Rohwer, Russell, Sanford, Sasscer, Schwarz, Siegler, Snyder, Symons, Walton, and Wood, members and C. C. Craft, J. R. Malloch, and R. C. Shannon, visitors.

The following proposed at the 261st meeting of the Society were elected active members: C. T. Greene, Carl Heinrick, J. D. Hood, F. Johansen, and W. Middleton. In addition the following names were proposed for active membership: F. C. Craighead, A. B. Duckett, and W. S. Fisher. Under suspension of rules, the three were elected.

Under new business the Recording Secretary read the following proposed amendments to the constitution:

Article IV to be amended to read as follows:

The officers of the Society shall be a President, a First Vice-President, a Second Vice-President, a Recording Secretary, a Corresponding Secretary-Treasurer, and an Editor, to be elected by ballot at the annual meeting. There shall be an Executive Committee consisting of the officers of the Society and three members to be elected by the Society in the same manner and at the same time.

Article V to be amended as follows:

Section 4. The Editor shall edit the magazine published by the Society under the direction of the Executive Committee.

Section 5 to be the present Section 4.

Article III, Section 3, third paragraph to read as follows:

Honorary members shall be proposed only by the Executive Committee. They shall then be voted upon by all of the active members of the Society, the ballot being taken by mail, due notice of the Committee's nominations having been sent to each member. Ballots received later than 60 days after the mailing of the Committee notice shall not be counted. A unanimous vote of the Executive Committee shall be necessary to a proposal and a four-fifths vote of the active members casting ballots shall be required to elect.

The question of a seal for the Society was mentioned and it was moved and seconded that the Executive Committee take up the matter with power to act.

Under the title "Some recent Experiences in Europe" Dr. L. O. Howard spoke of his last summer's trip to England, France, Holland and Germany for the purpose of interviewing European shippers of nursery stock to America and the officials charged with the carrying out of the foreign inspection laws. He also spoke especially of the International Entomological Congress at Oxford and showed photographs he had taken of many of the European entomologists in attendance as well as of others he had visited on the continent.

The second paper was presented by Mr. W. R. Walton:

THE VARIATION OF STRUCTURAL CHARACTERS USED IN THE CLASSIFICATION OF SOME MUSCOIDEAN FLIES.

By W. R. Walton, *Bureau of Entomology.*

Since the publication of Baron Osten Sacken's admirable Essay of Comparative Chætotaxy[1] in 1881, the use of characteristic bristles as a means to the classification in the Cyclorapha has become general among dipterologists and has resulted as a whole to the great advantage of science. There must, however, exist a limit beyond which these chætophorous characters become unreliable, especially as a guide to specific values. So it has been with this idea in view and in hope of securing data regarding such limitations that these somewhat fragmentary studies have been undertaken whenever proper material and time permitted.

[1] Mitth. d. Münchener Entem. Vereins, vol. v, pp. 121–138. 1881.

Calliphora viridescens Desvoidy, a common blow fly referred by some authors to the family Muscidæ and by others to the Sarcophagidæ is a species known colorationally from its North American congeners by the black cheeks and beard, but structurally solely by the presence of a third pair of posterior intraalar bristles.

An opportunity of studying the relative constancy of this character was afforded during the year 1908 at Harrisburg, Pa., by rearing it in considerable numbers from the putrid body of a snake. No less than 540 full sized individuals, comprising three species, having been reared from the body of the reptile which in life, could not, have exceeded 24 inches in length.

Of the number mentioned above 247 proved to be *C. viridescens*. The entire series was examined individually and the results tabulated, they are as follows:

Number of specimens examined	247
Number of males examined	131
Number of females examined	116
Number of males abnormally bristled	20
Number of females abnormally bristled	32
Total number of abnormal specimens	52 or over 20 per cent
Number of males with supernumerary bristles	20
Number of females with supernumerary bristles	30
Number of females with less than 3 intraalars	2

In nearly all cases where supernumerary intraalar bristles occurred they were smaller than normal. In other words there was an apparent tendency of the most cephalad towards obsolescence. In several cases no less than five macrochætæ replaced the usual three, the more frequent number, however, was four and the aberration was bisymmetrical or otherwise. Two individuals possessed but a single pair of posterior intraalars on each side and could therefor not be distinguished structurally from *Calliphora erythrocephala*.

In no group of the Diptera have chætotactic characters proven of greater service than in that exceedingly large and homogeneous assemblage designated in the works of the more conservative authors as the family Tachinidæ.

Some nineteen years have elapsed since Dr. S. W. Williston[2] pointed out the remarkable structural variation to which the species *Belvosia bifasciata* Fabr. is subject. He remarked the variation in the ciliation of the fascialia, comparative length of the antennal joints, angularity of the fourth vein and in the male, of the length of the anterior claws. So it is perhaps not surprising that a corresponding variation is found in the number and arrangement of the macrochætæ particularly of the thoracic region, but also of the abdomen in this species.

[2] Insect Life, vol. v, p. 238.

The appended table has been constructed from ten specimens of the above mentioned species, ranging gradually from 12 to 19 mm. in length, measured from the outer edge of the front to tip of abdomen. These measurements probably represent the extremes of size in the species, although Mr. D. W. Coquillett[1] gives them as 13 to 17 mm.

In the existing synoptic tables, the branch of the dichotomy running out at *Belvosia* reads "Ocellar bristles wanting." By reference to the present analysis it will be seen that these bristles are present in five out of the ten specimens examined, in four of them only on one side of the head, in the remaining case bisymmetrically developed. When present they are directed forward, not strongly developed but perfectly distinct from the surrounding hairs with an ordinary hand lens.

In Mr. Coquillett's table of the genera, dichotomy 116, one branch of which runs to *Belvosia* we read "Second segment of abdomen never bearing more than four marginal macrochætæ." By the present analysis we see that they may vary from 2 to 6 and are asymmetrically placed in two out of ten cases.

Mr. Coquillett further says "Our species (of *Belvosia*) have four post sutural (dorso central) and four sterno pleural macrochaetæ." It will be seen that this occurs in only one-half the specimens examined. The fact is these macrochætæ are wofully variable in number, size and arrangement.[2]

A glance at our table shows that the marginal macrochætæ of the scutellum increase in number almost directly as the length and robustness of the body, in fact generally speaking the larger, stouter, and therefor more fully developed the specimen, the more numerous the macrochætæ become on all parts of the thorax.

Mr. C. H. T. Townsend[3] has said: "It has been alleged that much of the so-called synonymy in this superfamily, as it stands in the Aldrich Catalogue, is due to a misguided erection of species on stunted specimens developed from underfed larvæ, through a lack of acquaintance with the breeding habits of the species. It is well known to all students of the Muscoidea that the females sometimes, if not frequently, carry the act of oviposition to an extreme, ovipositing upon larvæ that are already overstocked with

[1] Revision of N. A. Tachinidæ, p. 84.

[2] The author wishes to disclaim most emphatically any intention or attempt to discredit this admirable and indispensable paper of Mr. D. W. Coquillett's. It is a pioneer work and necessarily not perfection. Mr. Coquillett was fully aware of the fact, and had he lived to complete his life work, it is altogether probable that a perfected revision of his paper which he contemplated would have eliminated any fault in the content of the original work.

[3] The Taxonomy of the Muscoidean Flies, Smithsonian Misc. Col. No. 1803, p. 19.

eggs. This has been observed and recorded in a number of instances. It has been observed at the Gipsy Moth Laboratory of the Bureau of Entomology in Massachusetts that tachinids would oviposit at times upon larvae covered with eggs, while masses of unstocked larvæ were abundant close by. . . . . Similar conditions could hardly arise except through man's interference. . . . . The stunted specimens always exhibit practically the same characters, and if there is any exception, the true status of a specimen is quite recognizable.".

Specimen Nos. 1 and 2 are taken from a series of 14 reared from one pupa of *Basilona imperialis.* Furthermore it contained in addition to the 14 which emerged one dead Tachinid puparium and a shriveled larva, the puparia were crowded tightly together occupying every available space within the pupa shell. The larva of the host was collected from nature at Catawissa, Pennsylvania and sent to the Division of Zoology at Harrisburg, Pennsylvania, where H. O. Marsh made the rearing. *E. imperialis* is a native species and since there is practically never an abnormal plentitude of these large insects, at most, never so many as to upset the equilibrium of nature, it must be admitted, in the light of the facts noted below, that too many larvæ fed upon this individual, to permit of a full development of the resulting adults. There is no evidence here of "mans interference."

Specimen number seven was reared from a pupa of *B. imperialis* collected from nature as a larva at Rockville, Pennsylvania, by A. B. Champlain. It will be seen that it measures 4 mm. longer and is very much more heavily bristled than specimens number one and two. It was the sole inhabitant of the host pupa, which was rather a small one for the species. But that this Tachinid is capable of still further development is shown by the measurements and chætophorous adornments of examples 8, 9 and 10. So it may be assumed that had more food been available for specimen 7, further development would have resulted. In other words, it appears probable from the evidence here adduced that not only is the gradual increase in size due to increased food supply but the number and size of the macrochætæ increases almost directly with the size of the individual. Correlated with this is a gradually increasing brilliancy in color. The stunted specimens are pale, the golden bands of the abdomen are faded and the wings nearly hyaline, the squamæ dirty white. At the other extreme of size and chætophorous development, the colors are most brilliant, the bands of the abdomen are splendidly golden in contrast with the remainder of the abdomen which is intensely shining black, the eyes in life are purple and iridescent, the wings and squamæ are a very dark brown. Between these extremes there is a gradation of color. It may be seen from the foregoing

that the genus *Belvosia* as now known is based upon structural characters which are quite variable. Fortunately, that indescribable something which we call "habitus" is strongly in evidence in the genotype *B. fasciata*. But the question immediately arises; what about those genera and species of Muscoidea based almost entirely upon chætotactic characters and where habitus is weak?

In a series of 130 specimens of *Winthemia quadripustulata* reared from larvæ and pupæ of *Laphygma frugiperda* collected mainly on the grounds of the Department of Agriculture, Washington, D. C., during the month of September 1912, 9 specimens or about 7 per cent were found which cannot be properly placed specifically by the existing tables. Two group characters are used in these tables, one being the number of dorso central bristles, the other, the number of sterno pleurals. No variation was found in the number or arrangement of the former. In the latter, however, the number and also the arrangement was found to be variable to the extent noted above. Seven of the variants are males, five of them large specimens. The two females are smaller than average size. In the males the arrangement of the sterno pleurals giving the left side first is as follows:

	3 specimens 1-1, 1-2
	2 specimens 2-1, 2-1
	1 specimen 2-1, 1-1
In the females	1 specimen 1-2, 1-2
	1 specimen 2-1, 1-1
	1 specimen 1-1, 2-1

It will be seen from the foregoing that the variation is both symmetrical and otherwise in the series and that the supernumerary bristle may be placed either at the anterior or posterior corner of the sterno pleura. Thus the stability of this character in *Winthemia* is evidently far more absolute. There is also apparent in this series a considerable variation in the comparative lengths of the second and third antennal joints and in the width of the latter.

In justice to Mr. J. D. Tothill it should be stated here that an examination of the cotype material of his *Winthemia fumiferanæ* shows the species to be obviously distinct from *W. quadripustulata*, notwithstanding the above noted failure of the sterno pleural characters.

There is one other character used in connection with the Tachinidæ which needs careful investigation, namely, the hairiness of the eyes. In a series of 24 specimens, 12 males and 12 females, of *Myiophasia ænia* Wied. reared as parasites of *Chalcodermus æneus* Boh. by G. G. Ainslie of the U. S. Bureau of Entomology, at Clemson College, South Carolina, the males have hairy eyes

and the eyes of the females are bare. The amount of pilosity of the male eye varies.

Mr. C. H. T. Townsend[1] has erected the genus Ennyomma on a single male of this species because of the hairy eyes and has since declared[2] "The genus may be distinguished from both *Myiophasia* and *Phasioclista* by its thickly hairy eyes." The hairiness is variable and is a secondary sexual character at best; further comment is unnecessary. Few of us will be willing to assent with Mr. C. H. T. Townsend[3] that "these forms cannot be classified in the ordinary way . . . . there is no such thing as a species in the generally accepted sense," and further "the only safe course to pursue is to give a name to every assemblage that can be distinguished from other assemblages." etc.

This sounds suspiciously like an acknowledgment of defeat. The Muscoidean flies are subject to the same general laws of development as all other insects and can probably be classified without erecting a new system of nomenclature.

Dr. S. W. Williston[4] has said "We yet know very little about individual variation in this family (Tachinidæ), or the real value of many characters now used. The absence or presence of a bristle may be found to represent a group or species, but we should first learn *how constant the character is in species.*"

Nineteen years have since elapsed and his statement still applies to the situation. The required knowledge cannot be obtained with a pen and a few dried specimens, though rivers of ink flow. Nor can the problem be solved by the use of the dissecting needle and a vivid imagination.

The patient study of specific variation in even a few of the most homogeneous groups will certainly throw considerable light on the subject and this method is perfectly practicable for any worker who has the opportunity of rearing tachinids in numbers.

As was acknowledged at the beginning of these remarks, the studies herewith included are but fragmentary in character, nevertheless, the evidence drawn from them points quite strongly toward several definite conclusions.

1. The chætotactic characters as at present used in the classification of Muscoids are variable to a considerable degree and should be tested whenever opportunity permits.

2. These characters are in some species subject to variation *with the fluctuation of food supply of the larva.* This phase of the question must be investigated in connection with any studies of specific variation.

[1] Trans. Amer. Ent. Soc., vol. XVIII, p. 370.
[2] Taxonomy of Muscoidaen Flies, p. 58.
[3] Taxonomy of the Muscoidean Flies, p. 13.
[4] Insect Life, vol. v, p. 238.

3. The hairiness of the eyes in some forms of Tachinidæ is a secondary sexual character and is therefor not available as a primary generic character, unless both sexes are known to the describer.

There are also certain other recommendations which could be adopted to advantage in the study of the Muscoidean flies, namely:

a. The erection of a genus on a single example of either sex is folly and should not be permitted.

b. The proposal of a new species on a single specimen or a series representing only one sex is inadvisable.

c. The creation of either a genus or species on solely chætotactic characters without a careful study of ample material is unwise.

d. The variants of a species should be conserved under one species name until good and sufficient evidence is adduced to prove they are otherwise. The splitting of species in the genus Lucilia[1] as practiced by Mr. Townsend is a negative example of what is here meant.

Analytical Table, Constructed on Ten Specimens of Belvosia Bifasciata, Showing Structural Variation.

	Ocellars		Dorsocentrals		Acrostichals		1st Abd. marginal		2d Abd. marginal		Marginal scutellars		Sternopleurals		Fascialia bristled on		Length body	Width abdomen	
	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	*mm*	*mm*	
1	0	1	4	4	4	4	1	1	1	1	4	4	4	4	½	½	12	5½	From series of 14 reared from a single larva of Eacles imperialis, Catawissa, Pa.
2	0	0	4	4	3	4	1	1	1	1	4	4	4	4	½	⅔	13	6	
3	0	0	4	4	4	4	1	1	1	1	5	4	4	4	½	⅔	13	6	Collected, Hertford, N. C.
4	0	0	4	4	4	4	1	1	1	1	4	4	4	3	⅔	¾	14	6½	Collected, Hertford, N. C.
5	0	0	4	4	4	4	1	1	1	1	5	5	4	4	⅔	⅔	15½	7	Collected, Hertford N. C.
6	1	0	5	1	5	4	1	1	1	1	5	5	4	5	⅔	¾	15½		Collected, Anacostia, D. C.
7	0	0	5	6	5	5	3	2	3	3	8	6	6	6	⅔	¾	16	8	Reared from larva of Eacles imperialis, Rockville, Pa.
8	1	1	6	6	4	4	3	3	3	2	8	6	7	7	⅔	⅔	18	9	Collected, Harrisburg, Pa.
9	1	0	5	5	5	5	3	2	2	3	6	6	6	5	½	⅔	18	9	Collected, Harrisburg, Pa.
10	1	0	5	5	7	9	3	3	3	3	6	5	6	5	⅔	¾	19	9	Collected, Inglenook, Pa.

[1] Taxonomy of the Muscoidean Flies, pp. 118–123.

It seems possible that the studies of the internal anatomy of these flies upon which Mr. C. H. T. Townsend is at present working may eventually prove useful as an index to group relations. But the mass of undigested facts, near facts and conjecture with which he is at present deluging the devoted heads of his confrères will require an immense amount of elucidation, rearrangement and generous elimination before becoming available for use.

To conclude, there is great need of careful rearings of species belonging to homogeneous groups, from known parents, for the purpose of studying variation of structure, color and size within the species and, failing which our knowledge of the true relations of the Muscoidean flies will never extend much beyond its present meager limits.

In discussion, Mr. Malloch said that the tendency towards variation in the number of macrochætæ in Diptera is more pronounced in the higher groups, such as the Anthomyidæ and Tachinidæ, where the number of those macrochætæ is much larger than in the other groups such as the Tetanoceridæ, Ortalidæ and Phoridæ. In those groups with a few thoracic, or leg macrochætæ there is but little tendency to variation, and as a rule their number and situation is remarkably constant. When any duplication such as in the frontal bristles, occurs in the Acalyptrate Muscidæ, it is the almost invariable rule that the normal bristle is reduced in size and moved from its usual position. When variation, either duplication or reduction, in the number of macrochætæ occurs it is almost impossible to place species of Tachinidæ by using the tables of genera in the published works on the family. Too much weight has been placed on the length of the third antennal joint as compared with the length of the second. This also is a character that is prone to vary, as is also the length of the hairs on the arista. The hairs on the eyes, while under normal conditions easily discernible, in many species in the males, are most difficult to detect in the females of the same species. This applies not only to the Tachinidæ, but also to the Anthomyidæ, in which family far too much use has been made of this character in generic tables. In the latter family the generic tables in Williston's Manual are of little use for the identification of some groups. About one-half of the species in *Fannia* (*Homalomyia*), for exam-

ple, cannot be relegated to their proper position, because the calyptra are not noticeably dissimilar in size as required by the table. In examining large numbers of Diptera during the last 10 years, submitted form various Institutions and individuals in England and Scotland, it has been impressed upon me that the more macrochætæ a species has the more prone they are to vary in number and strength, and the larger the number of veins, such as in the Therevidæ, Tipulidæ and Asilidæ, the more variation there is in the number and course of those veins. It is rarely the case in species without recurrent veins that there is much variation, though I have seen several specimens, probably about half a dozen, out of about 7000 or 8000 Phloridæ examined in which abruptly terminated, instead of complete, veins occurred, or in which a small appendiculate vein was present, or a fork absent. In such cases only a thorough knowledge of the group will give one the necessary basis for identification. Arbitrary tables fail with abnormal specimens in any order, and the general habitus of the insect coupled with special knowledge must necessarily serve for identification purposes.

Mr. Schwarz remarked that in Coleoptera macrochætæ are to be found in many parts of the body and are successfully used as specific characters especially in Carabidæ and Staphylinidæ. As far as the North American fauna is concerned, Dr. Leconte was the first to call attention to their importance. In many instances the macrochætæ are lost but the pores remain and are remarkably constant in their position, for instance in the genus *Platynus*. They do not seem to occur in the large phytophagous families, at least not in the imago stage, unless we consider the sensitive hairs on the antennæ of certain Cerambycidæ and Rhynchophora as macrochætæ.

The third paper on the program was read by Mr. Thomas E. Snyder:

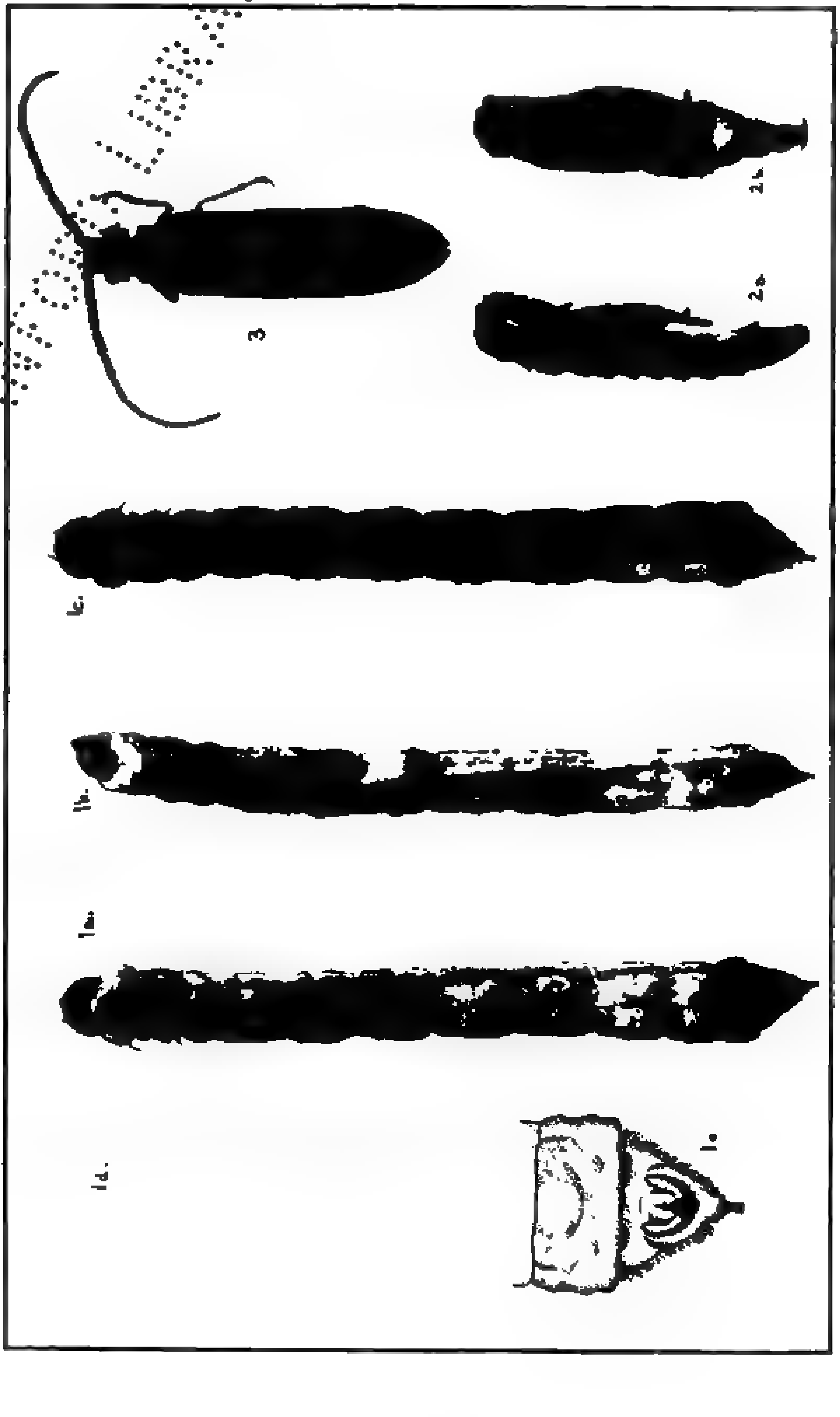
RECORD OF THE REARING OF CUPES CONCOLOR WESTW. (Coleoptera.)

By Thomas E. Snyder, *Bureau of Entomology.*

The position of the family Cupesidæ in the classification of Coleoptera has long been of interest to the systematist. So far as is known there are but meagre descriptions of the habits of these beetles and no figures of the larvæ exist. The larvæ of *C. concolor* are wood-borers, excavating longitudinal burrows in solid but decaying chestnut and oak wood; the burrows are packed with fine, digested boring dust. The pupal cells are cylindrical with rounded ends. Larvæ were first taken from the solid but decaying wood of the butt of a chestnut telegraph pole near Boykins, Virginia, on August 9, 1910, but remained unidentified. The pole had been broken off during a storm and reset sometime previous and the butt was lying on the ground. On May 1, 1912, numerous larvæ were found in the wood of a solid but decaying oak log lying in the woods near East Falls Church, Virginia. Some larvæ were in the prepupal stage. On May 22, one larva was found to have pupated since the preceding day. The pupa had transformed to a living adult sometime before June 6 on which date the adult was mature and another larva was found to have pupated. A third larva pupated on June 20 (since June 19). On September 17, 1912, similar larvæ were found in the decaying wood of a black oak stump near Elkmont, Tennessee, in the outer layers of wood but have not yet transformed. Burrows of the larvæ have been found in old, oak trestle timbers.

The larva figured is 23.5 mm. in length, white, elongate and sub-cylindrical. Body gradually broadening from the sixth to the eighth abdominal segment, ninth abdominal segment conical, with numerous long hairs on sides, armed with more heavily chitenized sharp tubercles, being produced to a narrow, heavily chitenized, cylindrical anal process; anal process widening at apex, tip concave. Pleural ridge on all abdominal segments. Prothorax prominent, approaching the characteristic dilation of *Eupsalis* and Lymexilonid larvae, broader than head and other thoracic segments. Prosternum broad, flat, armed with numerous chitenized asperities. Legs 5-jointed excluding claw; first joint large, flattened, fleshy lobe. Labium with hairs on anterior portion. Antennae 4-jointed. Maxillae with all three parts distinct; lacinia thick and fleshy, with long hairs pointing inward on anterior portion, palpi 3-jointed; galea 2-jointed. Labium black, chitenous, chisel-edged emarginate, with 2-jointed palpi. Mandible black, chitenous with large, blunt basal tooth and 3 other teeth.

Pupa figured is 11.5 mm. in length, white, body somewhat flattened, abdominal segments gradually broadening; anal segment widest, conical;



CUPES CONCOLOR WESTWOOD

genitalia with 2 lateral, curved, chitenous hooks, pointing anteriorally. Dorsal carina running the whole length of the body, becoming more distinct toward the end of the abdomen. Antennae lying ventrally, overlapping the elytra. Head bent ventrally at right angles to prothorax. First pair of legs lying between other pairs.

EXPLANATION OF PLATE I

CUPES CONCOLOR WESTW.

Fig. 1. *Larva* (23.5 mm.). (a) ventral view, (b) lateral, (c) dorsal, (d) mouth parts, ventral view, (e) anal segment, ventral view.

Fig. 2. *Pupa* (11.5 mm.). Note last two joints of the left antennae of pupa figured are deformed. (a) lateral view, (b) ventral view.

Fig. 3. *Adult*

Photographs by H. S. Barber. Drawings by C. T. Greene.

OBSERVATIONS ON THE LIFE HISTORY OF MICROMALTHUS DEBILIS LEC.

(Coleoptera.)

BY HERBERT S. BARBER,
(Bureau of Entomology.)

In February, 1911, Mr. T. E. Snyder of the Bureau of Entomology, brought me for determination, some minute larvæ he had found in the buried end of a chestnut telegraph pole in this city. They were utterly strange to me but by chance the almost forgotten plate (here reproduced) of Micromalthus by the late Mr. H. G. Hubbard,[1] the first figures published by him, came to mind and the details there shown agreed so exactly with the fresh larvæ, that the determination was considered positive.

The history of our knowledge of this beetle is interesting. In August 1874, Messrs. Hubbard and Schwarz found a colony of larvæ, pupæ and teneral imagoes in a red-rotten oak log near Detroit, Michigan. They sent specimens to Dr. LeConte, whose description of the new genus and species, placed tentatively in the Lymexylidæ, appeared in their "Coleoptera of Michigan"[2] with Hubbard's description and plate of figures appended at LeConte's request. Its assignment to the Lymexylidæ was decided upon after correspondence between LeConte and Hubbard, the latter having found some points of similarity in the larvæ of *Hylocœtus*.

[1] Proc. Amer. Philos. Soc., XVII, 1878, pp. 666–668 pl. XV.
[2] l. c., p. 613.

I do not know of another published reference to the beetle, except the checklist inclusion of the name, and Blatchley's[1] reference to the original capture by Hubbard and Schwarz.

In August of about 1882 or 1883, a flying adult lit on Mr. Schwarz's newspaper while he was reading in front of Professor Riley's house (on R st., near 13th, this city), and was immediately saved for the collection. Twenty years later (August 9, 1902) one alighted on my shirt while I was riding with Mr. Schwarz one warm afternoon on the Cabin John Car, just outside the District. This remained unique in my experience for nine years, until Mr. Snyder's larvæ were identified. Mr. Charles Dury writes that on August 9, 1911, one lit on his paper at dusk in Cincinnati, Ohio, this being his only experience with the species.

Mr. Snyder has found the larvæ occasionally since, and has kindly furnished the following locality and host-plant records. The first colony found extended 2 or 3 feet below the brick sidewalk in the base of a chestnut telegraph pole (on 9th Street near "P" Street N. W. Washington, D. C., February 3, 1911), the larvæ making shallow longitudinal burrows filled with fine, boring dust in the porous layer between the harder layers of annual growth. These burrows occurred only in the moist outer layers of the wood which had reached the red stage of decay. A second colony was found at East Falls Church, Virginia, March 18, 1912, in the moist outer layers of a decaying chestnut log and, in the jar of this material kept for rearing, a winged adult was found alive on July 20, 1912. Another colony was found near the same locality, on June 4, 1912, living in a chestnut stump; and a yellow pine log at Natural Bridge, Kentucky, (September 6, 1912) contained a very numerous colony of larvæ in the rotting, softer parts between the more resinous annual rings.[2]

[1] Coleopt. of Indiana, 1910, p. 895.

[2] Subsequent to the presentation of this paper, the breeding cell of this material disclosed on February 8, 1913, a few little, legged larvæ and when the rotten wood was broken up it was found that the colony was apparently just coming to maturity. Several specimens of the reproductive form were isolated, one of which began giving birth to young almost immediately (tail first and active, but becoming quiescent for a time afterward). Another, much shrunken, was with her nine young in her cell. Another cell contained twenty-one young but the mother could not be found. Two others of the reproductive form show the mandibles and anal armature of the unborn embryos through the dorsal integument,—fourteen in one, eight in the other. A number of mature larvæ in various stages between the still feeding, dark-colored specimens (having the alimentary tract distended with food), up through the slow process of preparation for moulting, into the white reproductive form were found and isolated. Isolations of the progeny have been made in the hope of ultimately getting the winged adults of both sexes. It is sincerely hoped that someone will secure the missing links in the life cycle and also determine the factors controlling the development

One day last August (1912), Mr. Snyder remarked that a certain old chestnut log on Plummer's Island, Maryland, looked right for them, and in a few minutes showed me a colony there. Since then I also, have been able to find them, for these larvæ seem to occur in almost any old red-rotten or yellowish-brown decaying oak or chestnut log, lying in the woods along the Potomac, but the original capture by Hubbard and Schwarz, i.e. the occurrence in one colony of numerous larvæ, pupæ, pædogenetic reproductive form and winged adults ready for issuance, does not seem to have been duplicated.

My first suspicion that we were dealing with a really remarkable case, came while looking at one of the vials of material that Mr. Snyder wished identified. This contained three forms of larvæ, but the idea of identity was so improbable, that its expression then would have seemed out of place. In addition to the normal legless larva figured and described by Hubbard, there was a form about one-half its length, similar in head and anal appendages and furnished with long, slender, weak legs which are most remarkable in the chitinized elongate tarsus, bearing two claws (see plate III, fig. 2*b*). The third form was more robust than the normal larva and seemed to be almost free from segmentation; the whole body being soft and formless, the head indistinct, soft and white, except the tips of the mandibles; the tail devoid of the chitinous armature, but terminating in a blunt, transverse carina. It was thought for a time, to be some obscure Dipterous larva, but some resemblance in the contour of the head, and its repeated occurrence with *Micromalthus* larvæ, suggested the possibility of its being a prepupa.

This hypothesis was shattered one afternoon at Plummer's Island, when embryos began issueing alive, but in an oval shape, from the ventral surface, close to the tip of the body of one that had shortly before been isolated in a small vial. I watched two issue, but my field lens was too weak, and more urgent work pressing. Next morning there were seven young legged larvæ crawling about in the vial, while the mother was somewhat shrunken and remained inactive. Lateral and ventral views of this specimen are shown on plate III, figures 1, 1a. while figure 2

of the pædogenetic or sexed broods. Perhaps it may be merely a change in temperature due to exposure of the log to sunshine, or food modified by the growth of other organisms or ferments in the rotten wood. Mr. Schwarz recalls that the original capture was in a large log in an open space in a swamp and that the sun shone freely upon the log, while the adult reared by Mr. Snyder was from a log on an open, sunny hillside. It seems imperative that we secure the sexed adults, particularly the egg-laying female and determine if the young larvæ hatching from her eggs are identical with the young legged larvæ here shown.

is one of her young. Thinking she might give birth to more, she was kept in a hollowed, split chip, with some of her young, but she rotted suddenly about a week later, and her young had disappeared in the wood. Two other isolations of this sort yielded respectively, three and five, legged larvæ from the supposed prepupal form, and these legged larvæ crawled into the pores of the wood, fed, lost their legs, and became the normal larva of Hubbard. These larvæ appear to be remarkably slow in their growth, four months (August to December) showing but slight increase in the size of young specimens in captivity. It is impossible to say at present, what substance in the rotting wood furnishes their nutriment. Often the young larva is found following one of the comparatively large pores of the oak wood, leaving the hole behind it plugged with fine particles from the walls of the pore which seems to be only very slightly enlarged, only the tyloses appearing to have been eaten. After the newborn, legged larva had been left a few hours in the crevice of a chip, the alimentary canal could be seen to contain minute quantities of food, of a brown color like the decayed wood.

An examination of Hubbard's alcoholic material discloses several specimens of the reproductive form, some of which contain embryos, while others had given birth to their progeny. A single specimen of the normal tailed and legless form of larva, is remarkable in that the body contents has separated into oblong oval bodies, assuming the appearance of the embryos in the reproductive form. This may be accidental or it may be significant. In another vial are numerous pupæ some of which seem to support the idea of the occurrence of winged adults of both sexes, but as they have been in alcohol for nearly forty years their condition is not the best. No sexual differences are observable among the few winged adults still preserved in the collection. These are thought to be males although the anal structures, seen in cleared slides, are not comparable with the genitalia of any beetle known to me.[1]

[1] A specimen was sent to Mr. Fredk. Muir of Honolulu, who, with Dr. David Sharp has just published an extended paper on the male genitalia of beetles (Trans. Ent. Soc., London, 1912, pp. 477–642, plates XLII–LXXVIII) and his reply seems to leave the sex still more uncertain. He writes, ". . . I should have pronounced it a female. There is no *definite male structure*, and the only way to settle the point definitely is by dissection of the body of a fresh specimen for the testes or ovarian tubes. If this be a male then the only form I can associate it with is *Cyphon* and *Microcara*, a group which Sharp and I have not yet been able to connect with any other form, or even to associate together with any certainty. *Micromalthus* may be somewhat like *Cyphon* (I am here only judging by the ædeagus and not by any other external structure)."

It would be out of place now, to formulate a definite explanation of the unusual life cycle, that is here apparant, and which may be summarized, as far as has been observed, into the five stages: (1) viviparous, larviform, reproductive stage, in cell in wood, giving birth to (2) legged larvæ, which crawl into pores of the wood, feed, and moult becoming, (3) the legless larvæ described and figured by Hubbard, and from which it is believed either the reproductive form (1) or (4) the pupæ of, (5) the winged adults are derived.

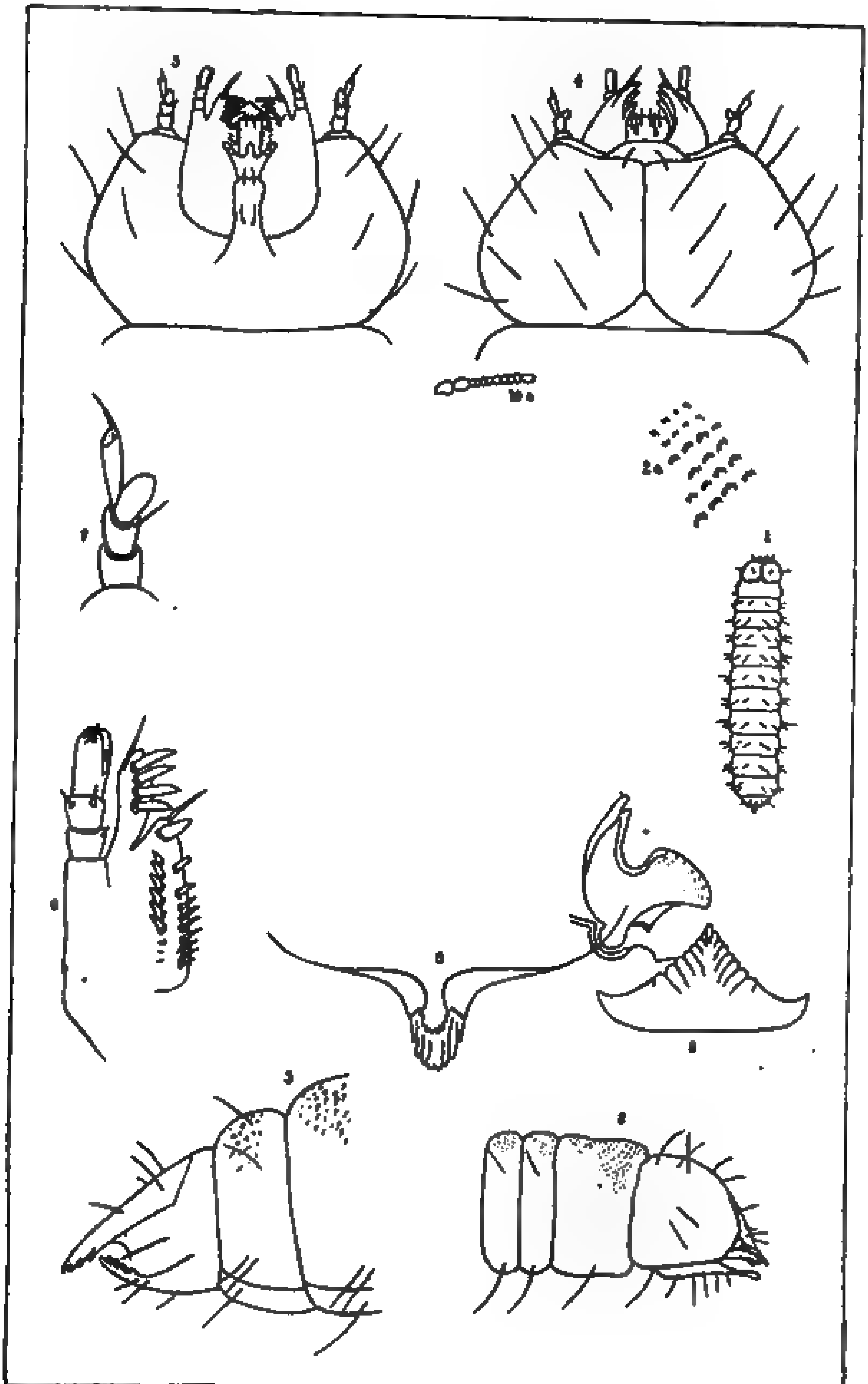
We may have here merely a case of extreme sexual dimorphism, as in *Phengodes*, which lay eggs or the Strepsiptera, which are viviparous, but if so, how is the fertilization of the helpless, reproductive form in the cell of the wood, often some distance underground, accomplished, and how can a new colony become established in a fresh log? There must be a migratory stage, more capable of travel than the crawling first larval stage. Perhaps a winged, egg-laying female will be found, proving the birth of the legged larvæ, from the degraded mother, to be pædogenesis, similar to that found in *Miastor*. The well-known agamic, viviparous reproduction of the Aphids may be considered a peculiar case of pædogenesis in which the young, being of the form of the adult may acquire wings or other adult characteristics, although they still remain essentially larvæ, the males and egg-laying females being regarded as the only really adult individuals.

The comprehensive article on viviparous and ovo-viviparous reproduction in the Chrysomelid genus Orina, by Champion and Chapman[1] brings together the literature on viviparity in beetles. The first mention seems to be Schiodete's account of the finding of well-formed larvæ, in the dilated abdomen of the very remarkable temitophilous Staphylinid, *Corotoca*. It is unfortunate that this paper has been followed by a period of sixty years in which, apparently, no corroborative observations have been made on these beetles which Professor Reinhardt found with certainty in every tree-nest of termites examined in the vicinity of Lagoa Santa, Minas Geraes, Brazil.

For the present the genus should stand alone in our classification, probably representing a distinct family, but it is not improbable, that some of the obscurely treated exotic genera of the Malacodermata, will be found to be allied to it. The possible relationship to the the Nitidulidæ, is suggested by the supplementary third antennal joint of the larva and is somewhat supported by the habitus of the adult.

[1] Tr. Ent. Soc., London, 1901, pp. 1-18 plates I and II)

[2] Vid. Selsk. Skr. 5R. naturo. og math. Afd. Iv, B-1854, author's separate, pp. 14-17, plate I.



H G Hubbard, del.

Micromalthus debilis Lec. and larva.

MICROMALTHUS DEBILIS LECONTE

The genus *Telegeusis* described by Horn[1], as belonging in the Drilidæ, shows some points of similarity, but the differences in venation, and genital organs are too fundamental, it appears, to allow their close association in the classification. Closer comparisons should, however, be made of *Telegeusis* and *Atractocerus* to determine the assignment of the former to the Lymexylonidæ[2]

The importance of these observations was recognized so late in the season that the writer failed to collect sufficient material to permit the dissection of the reproductive form, and on account of ill luck and difficulty in the breeding, many of the larvæ kept under observation have died. Lest some unforseen changes make it impossible to carry on further observations during the coming season, it is thought best to make the data so far secured available to those who may be better prepared to work out the complete life cycle and to make the important histological studies.

EXPLANATION OF PLATES

PLATE 2. REPRODUCED FROM HUBBARD[3]

Fig. 1. *Micromalthus debilis* Lec., larva enlarged twelve times.

Fig. 2. Head and thoracic segments, lateral view; much enlarged.

Fig. 3. Terminal segments showing the anal appendages, lateral view.

Fig. 4. Head from above, very much enlarged.

Fig. 5. Head from below, with mandibles omitted.

Fig. 6. Right maxilla, seen from below.

Fig. 7. Right antenna seen from below.

Fig. 8. Anal appendages, seen from below, very much enlarged.

Fig. 9. Corneous triangular piece lying above the mentum, with the left mandible thrown back, seen from above; the ridges upon the under surface of the mandible are indicated by dotted lines.

Fig. 10. Imago.

NOTE: For the sake of distinctness, the appendages in fig. 3 are drawn too large in proportion to the segments. The proportions are more correctly given in figures 1 and 8.

PLATE 3.

Figs. 1, 1a. Dorsal and lateral photos of reproductive form after it had given birth to seven young. Length about 3 mm. Thoracic segments con-

[1] Proc. Cal. Acad. Sci., vol. v, 1895, p. 242, plate xx.

[2] Since the above was written a specimen of *Telegeusis* was sent to Mr. F. Muir of Honolulu, who has kindly examined its genitalia and reports it to be a typical Lymexylonid approaching nearest to *Atractocerus africanus*.

[3] Proc. Amer. Philos. So., 1878, vol. XVII, p. XV.

tain irregular mass of dark foreign matter. Asterisk (*) indicates point whence the embryos issued.

Fig. 2. One of the legged larvæ borne by No. 1, much more enlarged. Length, distended, about 1.7 mm. 2a, head greatly magnified; 2b, sketch of hind leg, showing the two claws at tip of the chitinized tarsus.

Fig. 3. Larva, nearly full grown, in its gallery; much enlarged. Length about 4 mm.

IDENTITY OF SCOTIONEURUS STENOSTIGMA PROV.

By A. B. Gahan.

Through the courtesy of Rev. V. A. Huard of the Provincial Museum, Quebec, it has been the writer's privilege recently to examine the type of *Scotioneurus stenostigma* Prov. The genus was erected by Provancher (1886) for the reception of two supposed species of Aphidiinæ. One of these species, *S. dives*, was afterward found by its author to be the male of his previously (by pagination) described *Ephedrus incompletus*. In recording this fact Provancher (1888) whether intentionally or not, transferred the species to the genus *Scotioneurus*, notwithstanding it is plainly an *Ephedrus* and it has been so recognized by several writers since Provancher, [Urich (1893), Hopkins (1898), Gahan (1910 and 1011)].

The identity of the other species, *S. stenostigma*, which must be considered the type of the genus, has remained more or less of a mystery. Dr. Ashmead (1901) regarded the genus as a synonym of *Ephedrus* and in this he was followed by Szepligeti (1904) who indicated by a question mark his doubt as to the correctness of this conclusion.

In a revision of the Aphidiinæ of North America, the present writer (1911) made the following statement with reference to the species in question. "The type of *Scotioneurus stenostigma* has not been examined but judged by the figure of the wing given by the author it is believed not to belong to this group." This in effect left the genus and species unplaced in the classification.

It is with considerable satisfaction, therefore, that I am now able to state definitely that the species is not an Aphidiinæ but that it belongs in the Alysiidæ. Unfortunately the antennæ of the type specimen are missing, making exact determination difficult but it apparently runs to the genus *Aspilota* in Foerster's table of the Alysiidæ and is congeneric with specimens placed in that genus in the collection of the United States National Museum.

A description drawn from the type follows:

Aspilota stenostigma Provancher.

Scotioneurus steonstigma Prov., Add. Faun. Canad. Hym.. 1886, p. 157.

Female.—Length 1.6 mm. Antennæ broken. Head transverse, the occiput, vertex, frons and temples smooth and polished with scarcely any pubescence; occiput concave; temples broad, about as wide as the eyes; the vertex is divided by a shallow median longitudinal furrow; as viewed from in front the head is shorter than wide, the face below the antennæ smooth and covered with rather long hairs; eyes elliptical; cheeks short, clypeus prominent, its anterior margin convexly rounded, impunctate; mandibles tridentate, the median tooth slightly longer and more acute than the two lateral; viewed from the side the face is slightly convex below the antennæ.

Mesonotum smooth, polished, with sparse hairs, the parapsidal furrows absent on the posterior two-thirds, slightly impressed anteriorly; a short, shallow, longitudinal impression on the median line of the mesoscutum just before the scutellar fovea; scutellum smooth, polished, the scutellar fovea large and deep; mesopleuræ smooth, polished, with a short longitudinal more or less oblique crenulate furrow near the middle. Propodeum obliquely truncate, with a short median longitudinal carina anteriorly before the truncation, finely rugulose, the spiracles distinct, though not large; metapleuræ nearly smooth.

Wings hyaline, the stigma linear, scarcely wider than the postmarginal (metacarp) vein which is thickened slightly throughout its length; radial cell reaching to the wing apex, first cubital cell small, separated from the first discoidal and from the second cubital; second abscissa of radius more than twice as long as the first transverse cubitus, and nearly four times as long as the first abscissa; third abscissa of radius more than twice as long as the second abscissa: recurrent nervure joining the second cubital cell at an angle with cubitus so that the second cubital is five-sided.

Abdomen about as long as the head and thorax, petiolate, compressed into a sharp keel ventrally and at the apex; its first segment slightly wider at the apex than at base, two and one-half times as long as wide, regulose; following segments smooth and shining: ovipositor exserted about half the length of the abdomen and upward curved.

Color—Scape, pedicel, palpi, mandibles toward the tips and legs stramineous; head and thorax brownish black; pleuræ, propodeum and abdomen except ventral segments one and two more or less piceus, nearly black; tegulæ, wing veins and stigma yellowish brown, the stigma and marginal veins slightly darker than the others: ventral segments one and two more or less stramineous; ovipositor sheaths piceus.

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CHANGES IN THE MOSQUITO-FAUNA OF PANAMA.

By Frederick Knab, *Bureau of Entomology.*

That the changes in the physical features of the Panama Canal Zone brought about in the course of constructing the interoceanic canal would have a marked effect upon the life of the region has been repeatedly pointed out. It is unfortunate that no thorough study of the Panama fauna was made before radical changes in the character of the country had been brought about, so that their effect on its animal life might be determined.

The aquatic forms are the ones that must be particularly affected by the topographic changes in the Canal Zone. Streams have been changed in their courses, swamps have been drained and new bodies of water created. The mosquito life of the Canal Zone, with its many species (considerably over 100 are known from the region) and great diversity of breeding habits, must be particularly affected by these changes. Many species of peculiar habits, such as the many forms breeding in the water between

the leaves of various water-bearing plants, or in water in hollow trees and bamboo stumps, must have been eliminated with the clearing away of the forest. Others, particularly those breeding in smaller pools, undoubtedly have found increased opportunities for breeding within the zone of operations and multiplied propertionately—at least at times and in places. These opportunities for breeding must have fluctuated greatly with the progress of the work, involving as it does the constant creation of new breeding-places and their elimination or control. If it were possible to make a comparative study of the mosquitoes now existing on the Canal Zone with those found by Messrs. Busck and Jennings a few years ago, considerable changes could probably be shown to have occurred.

Imperfect as our information is, I have data which show that such changes have actually occurred. It would seem that with the creation of Gatun Lake a new element has been introduced into the mosquito fauna, or at least brought into prominence. Among the most important, considered as an annoyance, of tropical American mosquitoes, are the members of the genus *Mansonia*. *M. titillans* particularly is very widely distributed, occurring from Argentina to southern Florida, and is an aggressive biter. It is locally sometimes very abundant and troublesome. In working over the mosquito material from the Canal Zone collected by Messrs. Busck and Jennings from 1907 on, the absence of this characteristic species was most striking. Mr. Busck reported it from only one locality, Lion Hill, and Mr. Jennings did not send it in at all. Of a related species, *Mansonia fasciolata*, Mr. Busck obtained only a single specimen in the Zone, also at Lion Hill.

Another characteristic tropical mosquito of very wide distribution appeared to be absent from the Zone altogether. This is *Aedeomyia squamipennis* which ranges from Cuba to Argentina. Like *Mansonia titillans*, it is local and this local restriction only became comprehensible when the larvæ of the two species were found by Mr. H. W. B. Moore of Georgetown, British Guiana. The larvæ of both *Mansonia titillans* and *Aedeomyia squamipennis* occur associated with the aquatic plant *Pistia* belonging to the Araceæ. This plant floats in shallow water, its leaves spreading out at the surface, and to its roots the *Mansonia* larvæ are attached, extracting their supply of air from them. Just how intimate the association is in the case of *Aedeomyia* we do not yet know.

In lots of mosquitoes, taken recently and sent for determination by Mr. James Zetek, the entomologist of the Canal Zone, both *Mansonia titillans* and *Aedeomyia squamipennis* appear in considerable proportion. The former is second only to *Anopheles albimanus* in a catch from traps employed to capture mosquitoes attempting to enter habitations. The *Aedeomyia squamipennis*

all came from Gatun. *Mansonia titillans* occurred also in a lot from Miraflores. The explanation of the appearance of these mosquitoes in numbers is that the creation of the lakes at Gatun and Pedro Miguel has furnished an extensive habitat for *Pistia* and thereby abundant opportunity for *Mansonia* and *Aedeomyia* to breed.

In the discussion of Mr. Knab's paper Mr. Busck said that the eradication of certain species of mosquitoes as well as of many other insects on the Canal Zone was no more than could be expected as a natural result of the canal work and the sanitary measures in connection therewith. As the large trees with their host of water-bearing, mosquito breeding plant parasites are cut down and the bamboo swamps are drained, the shady habitat and characteristic breeding places of very many species of mosquitoes are entirely abolished and the extermination within the Canal Zone of such species is necessarily effected.

It is more noteworthy that certain other species of mosquitoes hitherto absent, or at least rare on the Zone, should have become established and abundant in spite of the constant warfare against mosquitoes by the Sanitary Department. But such is certainly the case with the two species *Mansonia titillans* and *Aedeomyia squamipennis*.

The reason for this lies in their peculiar biology, closely associated with and dependent upon the water-plant, *Pistia*, which make the larvæ of these species practically unaffected by any of the hitherto used control measures.

The *Pistia* formerly occurred only sparingly and in small colonies, mainly in the so called "Black Swamp," but the plant has now enormously increased, due to the greatly enlarged open areas of water, especially by the formation of the Gatun Lake, which now covers the Black Swamp. Large floating islands of *Pistia* now occur and afford unlimited breeding possibility for the two mosquito species which attach themselves to the roots of the *Pistia*. The effect was particularly noticeable on the part of the lake which was formerly the Trinidad River and where *Aedeomyia squamipennis*, unknown hitherto from the Canal Zone, this summer came by the hundreds every night, attracted by my acetelyn lamps and white sheets.

In combating these species the Sanitary Department on the Zone will have a new problem and it will probably be necessary to fish up or otherwise destroy these large floating islands of *Pistia.*

Under the heading of short notes Mr. Schwarz exhibited specimens of the Curculionid *Anthonomus irroratus* Dietz and berries of *Eugenia buxifolia* collected by him on the island of Key West, Florida during the month of April. These berries resemble good-sized peas and the Anthonomus was bred in some number from such berries which are slightly deformed. Upon further investigation it was found that the author of these deformations is a Cecidomyid. It appears that the Anthonomus larva destroys in some way the Cecidomyidous larvæ. Mr. Schwarz remarked that this is not the first instance known where species of Anthonomus are reported as being inquilinous in Cecidomyidous galls as instanced by *A. sycophanta* Walsh, and *A. aeneolus* Dietz. Finally Mr. Schwarz stated that *A. irroratus* is manifestly synonymous with *A. costulatus* Suffrian, described from Cuba and that the latter specific name has priority.

MEETING OF DECEMBER 5, 1912.

The 263rd regular meeting of the Society was entertained by Mr. C. L. Marlatt at the Saengerbund Hall, 314 C Street N. W. on the evening of December 5, 1912, There were present Messrs. Baker, Barber, Busck, Caudell, Cory, Craighead, Cushmann, Duckett, Dyar, Ely, Fisher, Foster, Gahan, Heidemann, Heinrick, Hood, Howard, McIndoo, Quaintance, Rohwer, Sanford, Sasscer, Scott, Schwarz, Shannon, Viereck, Walton, and Wood, members; and Mr. G. E. Bodkin and Dr. G. F. White visitors. President Quaintance occupied the chair. The minutes of the preceding meeting were read and corrected.

Mr. Rohwer read his report as Secretary-Treasurer. The chair appointed Dr. Dyar and Mr. Caudell as Auditors. Mr. Schwarz moved that the Society extend Mr. Rohwer a vote of thanks for the efficient manner in which he has conducted the financial affairs of the Society during the past year. Carried.

Dr. Dyar as editor reported that three numbers of the Proceedings had appeared during the year and that a fourth number was now in the hands of the printer. Dr. Howard moved that the Society extend to Dr. Dyar a vote of thanks for the able manner in which he has edited the Proceedings and for his interest in financing this publication. Carried.

The following names were proposed for active membership:—N. E. McIndoo, J. B. Gill, J. Malloch, and R. C. Shannon of the Bureau of Entomology and Prof. J. B. Parker of the Catholic University. Under suspension of the rules all five were elected.

Under new business the recording Secretary read the amendments to the constitution proposed at the 262d meeting. These amendments were voted on by paragraphs and adopted.

The following officers were elected for the year 1913: President, August Busck; First Vice-President, W. D. Hunter; Second Vice-President, A. N. Caudell; Recording Secretary, E. R. Sasscer; Secretary-Treasurer, S. A. Rohwer; Editor, J. C. Crawford; additional members of the Executive Committee: E. A. Schwarz; L. O. Howard and Nathan Banks. Prof. A. L. Quaintance was nominated to represent the Society as a Vice-President of the Washington Academy of Sciences.

At the request of President Quaintance, Mr. G. E. Bodkin, Government Economic Biologist of British Guiana, South America, gave a short account of Economic Entomology in his part of the world of which the following is a brief résumé:

Briefly indicating the geographical position of British Guiana he went on to describe the insect pests attacking the principal crop, which is sugar cane. The giant moth borer (*Castnia licus*) bores out the center of the canes and thereby has caused enormous reductions in the yields of sugar during recent years.

No parasites of this pest have yet been discovered for in all the stages of its life history it is singularly well protected. The eggs are deposited singly and the young larvæ on emergence from the egg, bore directly into the cane, undergoing the larval and pupal stages in that position. The moths are diurnal.

The small moth borers (species of *Diatræa*)also cause very considerable damage, and the weevil borer (*Sphenophorus sericeus*) is at times harmful. Shot hole borers (a species of *Xyleborus*) invariably attack canes that have been previously weakened by fungi.

Rice is also grown on an extensive scale, chiefly by native farmers (coolies imported from India). This crop is not seriously injured by insects as a general rule, but this season the young rice was in many cases entirely destroyed by *Laphygma frugiperda*. This insect in company with many other pests appeared in enormous numbers at the commencement of the wet weather, which, this year followed a prolonged drought.

Mr. Bodkin also said that in the future he hoped to have more attention paid to the insect fauna of British Guiana; for from an entomological point of view it is an extraordinarily rich, interesting, and practically untouched field. He also expressed his gratitude to those who had offered to assist him in this project.

NOTES ON THE YELLOW CRANE-FLY, TIPULA FLAVICANS FABR.

By A. N. Caudell, *Bureau of Entomology.*

On October 28 of the present year I found the above named insect in great numbers at Rosslyn, Virginia. They had issued from clay soil near the river in a situation subject to inundation and at most times very moist. Many hundred adults were flying about and the pupal shells were found in numbers on the ground beneath the thin layer of leaves and debris which had accumulated since the last overflow of the river. As shown by an examination of many old shells the pupa always project a considerable distance out of the ground when the adult emerges. Ordinarily they project about one-half to two-thirds their length, rarely as little as one fourth but often more than two-thirds, in some cases the shells being found entirely clear of the hole of issuance, indicating that they were entirely withdrawn by the adult in emerging. The soil is of a yellow clay nature and well filled with small rootlets upon which the larvæ of the fly probably feed. The occurrence of this species covers some weeks as Mr. Knab found them plentiful at this same locality as early as September 22. Still earlier in the season, in early August, this same situation was populated by another nearly related Tipulid of very similar superficial appearance and also a blackish marked species. Indeed this locality seems to be one very rich in its Tipulid fauna.

Many of these flies observed at Rosslyn were copulating, some during flight and some at rest on the ground or on leaves or twigs. In one case observed by me an apparently freshly emerged female sat on the ground within an inch of what I presume was the pupal shell from which she had issued and was quite covered with a yellowish mass of males. There were six of these males massed over and around this female, one of them mating with her, the other five sitting almost motionless, some with the mouth parts touching her abdomen.

In 1886 J. Mik[1] records observations on certain Tipulidæ mating when the female is freshly emerged. He states that the males sit and wait for the emergence of the females and when they appear mating commences immediately, even before the legs are entirely clear of the pupal shell and while the abdomen is still limp and watery. Observations of this character were made on species of three genera, *Cylindrotoma*, *Dicranomyia* and *Trochobola*. Mik records these observations to refute the idea advanced by another writer that the deposition of fertile eggs by a soft bodied freshly transformed female Coccinellid beetle was a case of parthenogenesis. Mik argues that, while the insect is not fully developed externally, it is sexually perfect internally.

Needham,[2] describes and figures the pupa of *Tipula flavescens* and states that he bred them in late September from clay subsoil brought up by crayfish in a glacial "pothole" in the state of Illinois.

Many hundreds of the specimens observed by me at Rosslyn, Virginia, were killed by some fungus disease. Dead flies were found in some abundance sitting head upwards on twigs and weed stems, sometimes singly but generally two or more together, often as many as five or six being found in a mass. The abdomens of the dead flies were found to be filled with a pulpy mass similar to that filling the bodies of fungus-killed lepidopterous larvæ. Flies freshly dead look as if perfectly well and active, unless it be that the legs are wrapped more securely around the twig or stem to which it clings. Specimens of these fungus-infested Tipulids were turned over to Prof. Webster for study and determination of the fungus. Other specimens are preserved in the National Museum collection.

LUMINOUS COLLEMBOLA

BY HERBERT S. BARBER, *Bureau of Entomology*.

Very few of us walk at night in woodland paths without a lantern and this fact is perhaps the explanation of the extremely meager data available on the subject of luminous Collembola. The almost universal ignorance here in America, that such photogenic function occurs in this order is, it is hoped, sufficient apology for the presentation of the following very imperfect observations, and résumé of previous notes which have been brought to my attention. It is hoped that these notes will yield an abundant crop of corroborative and advanced data by the end of another

[1] Ent. Nachr., vol. XII, p. 315.
[2] Bull. New York State Museum, No. 68, p. 280, 1903.

season. Histological work on the light-giving organs of these primitive forms may be of much value in the problem of photobiogenesis.

One night last fall (October [illegible]) the writer went to a spring in the woods on the Virginia shore of the Potomac opposite Plummer's Island and noticed a faint point of light on the wet surface of a rock which was at first mistaken for a young glow worm. A pocket electric flashlight was held close to the luminous point and then lighted revealing a small [illegible] Collembolan. Thinking a mistake in location had been made the light was put out and when the eyes were again adjusted to the darkness the luminous point was located exactly by placing a finger on each side and the electric light again flashed on, corroborating the first observation. The live specimen was then gotten into a clean vial and examined with a hand-lens in the dark and also by artificial light. No local light organs were to be seen, the light being constant and general but not intense enough for one to see the legs or antennae. The possibility of its being a case of infection by luminous fungi or bacterial growth was considered but as the specimen remained alive and luminous for three nights this hypothesis seems improbable. More specimens were sought immediately and in moving a leaf a very short dim flash attracted attention. When the light was thrown on the place a minute (about 1 mm. in length) white Collembolan of another genus was found but as it was not seen to flash again it was not taken, the impression of the flash being thought to have been an optical illusion similar to "seeing stars." When, however, ten minutes later the same impression of a very short, weak flash was again caught and traced to the same kind of minute white Collembolan which, happily, flashed a second and a third time while under examination, it became evident that the flash was not subjective but objective. Further search that night was without success. Although the two little creatures, alive in a moist vial, were looked at frequently no light was again seen from the small one. The next evening more specimens were sought, but only two, one of each kind, were found. These acted as on the previous evening but the larger was crushed and lost in trying to get it into a vial. The smaller one was only seen to flash twice. Colder weather, and the increasing light from the moon made several more attempts to find material fruitless.

The specimens were sent to Prof. J. W. Folsom who kindly determined the larger form as a species of *Anurida* hitherto unreported from this country which may prove to be one of the European species, while the smaller form agrees fairly well with *Neanura quadrioculata* Guthrie.

The light of *Anurida* was a continuous, pale greenish-yellow glow general throughout the body, and with a lens of 1½-inch focus could not be seen to be more intense in any organ of the body, but failed to display the legs and antennæ. The specimens of *Neanura* were only seen to flash at the time of their capture, and then not while looking at them with a lens. The impression received was that the flash was very short, perhaps between one fifth and one-half second duration as compared to the average camera shutter speed, and was repeated after perhaps 20 seconds, while the third flash (seen the first evening) was so faint as to be easily missed. The fact that the light is flashed excludes the idea of infection by, or feeding upon luminous bacteria, or fungi, as a cause of the light while the length of time that the *Anurida* lived in the vial (more than three days) would seem to indicate that its light also is primary.

The luminosity of the nests of Brazilian termites described by Castlenau (1850), Smith (1879), Severiano da Fonseca (1880), and Knab (1895) (1909),[1] is of interest in this connection for the descriptions of the multitude of minute moving lights which covered the surface of the nests is strangely similar to the impression received from reading Allman's or Dubois' account of the appearance of the ground where the luminous Collembolans were found. Urich's account[2] appears to refer to another sort of luminosity, probably "foxfire."

As will be noticed the writer's observations on the light of *Anurida* compare closely with Allman's and Dubois' observations on *Anurophorus fimetareus* and *Lipura noctiluca* respectively, while the flashes of *Neanura quadrioculata* (?) are similar but probably fainter than those seen by Molisch to emanate from *Neanura muscorum*. The notes by these three observers are the only other original observations that have come to the writer's attention.

Mr. F. Alex. McDermott in answer to my queries was kind enough to cite various accounts of luminous springtails and in order to bring before American observers the data found in looking up these notes they are briefly abstracted and appended chronologically, the first mention being quoted entire.

1851 Allman, Proc. Royal Irish Acad. Dublin, vol. 5, p. 125. "On the omission of light by *Anurophorus fimetareus*." The note in full follows:

"Professor Allman read a notice of the emission of light by *Anurophorus fimetareus* Nicolet (*Leptura fimetarea* Linn.). During a walk over the Hill of Howth near Dublin on a dark night in February last [1851] he was

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[1] See Science, October 22, 1909, vol. xxx, pp. 574–575 and Science, January 7, 1910, vol. xxxi, pp. 24–25.

[2] Journ. Trinidad Field Naturalists Club, vol. II, p. 288, 1896.

[illegible] with a luminous [illegible] in the earth when disturbed to a depth of [illegible] [illegible] *Anurophorus* [illegible] [illegible] beautiful phenomenon which was also witnessed by Dr. Stokes and Mr. Haliday as well as by numerous other friends whose attention was directed to it by Dr. Allman. The light [illegible] [illegible] in the insect. The Anurophorus was very abundant in the soil and subsequent observations proved that the dark peaty soil which abounds in some places in Howth was almost the only part of the district from which it could be affirmed to be absent."

1887 Dubois, C. R. Soc. de Biol. Paris, vol. [illegible], ser. 8, pp. [illegible] "La fonction photogénique des Podures" mentions Allman's observations and gives detailed account of his own observations on luminous Podurids similar to *Lipura ambulans* and *L. armata* near Heidelberg in October 1881.

1890 Gadeau de Kerville. Les animaux et les vegetaux lumineux, pp. 98-100, knew only the two accounts just cited.

1894 Dubois, Rev. Général des Sci. Pures et Appliqués, vol. v, pp. 415-422, and 529-534; not seen by the writer but the following is said to be an English translation of it.

1895 Dubois, Rep. Smithsonian Institution for 1895, p. 418, plate xxiii, briefly mentions luminous Collembolans as causing, when numerous, the soil in certain continental localities "to become luminous like the sand of the sea which contains Noctilucæ." He knew but one luminous species which he figures as *Lipura noctiluca*.

1896 Packard, Jour. N. Y. Ent. Soc. vol. iv, p. 61, alludes to the luminous Poduran *Anurophorus*. This is the only reference found in the American literature but is probably based upon Allman's observation.

1898 Dubois, Leçons de physiologie generale et comparée, Paris, pp. 418-420, quotes his previous account of his observations near Heidelberg, of Oct. 1881 on the species which is again figured as *Lipurca noctiluca*.

1904 Molisch, Leuchtende Pflanzen,' Jena; notes the light of *Neanura muscorum* Templeton. In the autumn of 1901 he took a

piece of rotten wood near Prag and placed it in a glass dish to examine occasionally for luminosity. It remained nonluminous for a fortnight but then, when shaken in a dark room flashed, to his amazement, with many fine points of light—the flashes lasting from several seconds to half a minute. Knowing the light of fungi to be constant and spontaneous, i.e., not subject to stimulation, he concluded he must have an animal organism to deal with and, although difficult on account of the minute size, was able to ascertain that the light eminated from the little springtails. When isolated in a small tube these insects would flash on being shaken, but after a few repetitions the faculty of producing light seemed exhausted until after a time at rest, when they would again respond to mechanical stimulus with a sudden flash. He cites Dubois (1898) and concludes that other forms of the Collembola may also be found to be luminous.

1904 Ludwig, Promethus, Jahrgang 16, pp. 103-107, cites Allman, Dubois (1886) and Molisch and gives a lengthy discussion of the possibility of luminosity being a result of feeding on, or living in contact with luminous fungal or bacterial growths.

1905 Pütter, Zeitschr. f. allegemein. Physiologie, Sammelreferate, 1905, p. 23, in a long article on luminosity in general, refers to Molisch's discovery.

1910 Mangold, Winterstein's Handbuch der Vergleichenden Physiologie, vol. III, 2, p. 290, in his long article "Die Produktion von Licht" leaves the Thysanura with the groups of insects doubtfully luminous, and gives a condensed paragraph referring to the Allman, Dubois, and Molisch observations.

Under the heading of short notes Mr. A. N. Caudell presented the following:

On October 1 of the present year I collected at Rosslyn, Virginia, seed heads of a species of *Bidens* many of which were infested with weevil larvæ, a single larva to the head. The larva lay hidden beneath the withered ends of the seeds it had consumed, Further search revealed some pupæ also, and later adults issued, proving to be *Conotrachelus geminatus* Fabr. This weevil is not common and its habit of pupating in seed heads seems unusual. The late Mr. Ulke collected specimens here in the District and the National Museum collection contains material from New York, New Jersey,

Ohio and Iowa as well as doubtfully determined specimens from Little Rock, Arkansas and Montreal, Canada.

As two of the eight or ten infested seed heads mentioned above contained pupæ of a hymenopterous parasite the percentage of parasitism appears to be quite large. Adults of the parasite issued a few days later and were identified by Mr. Viereck as the *Sigalphus curculionis* of Fitch.

EASTERN SPECIES OF RACHICERUS

The three species of the East occur near Falls Church, *R. flavicollis* at Glencarlyn in July; *R. obscuripennis* L. at Great Falls, fairly common, flying low and slow in June; and *R. nitidus* John. also at Great Falls in June. They may be separated as follows:

1. Thorax yellowish, legs (except tips of tarsi) yellowish; antennae of ♂ pectinate, ♀ hardly so—*flavicollis* Halid,
   Thorax dark, only humeri yellowish 2
2. Legs (except tip of tarsi) yellowish, thorax shining black, stigma and cloud beneath prominent; antennae hardly pectinate *nitidus* John.
   Femora and tibia more or less obscured; thorax dull blackish, stigma not prominent; antennae of ♂ strongly pectinate, of ♀ less so .... *obscuripennis* Loew

R. obscuripennis varies, much in size, some females being twice as long as others.

N. BANKS.

ASILIDS CATCHING HYMENOPTERA

Poulton has listed a considerable number of Asilids that commonly capture Hymenoptera. Besides his records are those of Cockerell, Daecke, and Laurent in Entomological News, and the oft-quoted habit of *Promachus* in catching the honey bee. At Falls Church I have taken *Deromyia ternatus* on three occasions with a species of *Vespa*, and once with a honey bee; and *Mallophora claucella* with a species of *Epeolus*.

N. BANKS.

NOTES ON DIPTERA

In Can. Entom., 1911, p. 130, I described a new species of *Laphria* as *L. dispar;* I find that the name is preoccupied and would replace it by *Laphria disparella* n. n.

In the fall of 1912 I took two rare Tachinids, *Euceromyia robertsoni* Towns. at Falls Church, September 14, and *Trichopoda plumipes* Fabr. at Great Falls, October 3. The *Euceromyia* was unknown to Coquillett, and the genus not in his table.

N. BANKS.

Actual date of issue April 9.

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON

VOL. XV 1913 No. 2

MEETING OF JANUARY 10, 1913.

The 264th regular meeting of the Society was entertained by Prof. A. L. Quaintance at the Saengerbund Hall, 314 C street N.W., on the evening of January 10, 1913. There were present Messrs. Barber, Busck, Caudell, Craighead, Crawford, Cushman, Duckett, Fisher, Gahan, Gill (J. B.), Gill (T. N.), Green, Hall, Heinrick, Holloway, Hood, Hopkins, Howard, Hunter, Johnson (F.), Knab, McAtee, McGregor, McIndoo, Malloch, Marlatt, Morgan, Myers, Parks, Popenoe, Quaintance, Rohwer, Sasscer, Schwarz, Shannon, Siegler, Snider, Walton, Wood, members, and Messrs, A. H. Clark, W. T. M. Forbes, W. H. Sill, F. L. Simanton, and J. F. Strauss, visitors. President Busck occupied the chair. The minutes of the preceeding meeting were read and corrected.

Mr. Rohwer stated the the Auditing Committee had examined his accounts as Corresponding Secretary-Treasurer and found them correct.

Mr. Rohwer read a communication from the International Committee on Nomenclature requesting the coöperation of the Entomological Society of Washington by appointing two of its members to serve on the American Committee of Entomological Nomenclature. After reading the letter, Mr. Rohwer spoke of the recent action of the Executive Committee in recommending Messrs. Crawford and Caudell to represent the Society. Doctor Howard suggested the name of Dr. C. W. Stiles, whom he considered to be admirably fitted to serve on such a committee. A ballot was taken resulting in the election of Mr. J. C. Crawford and Doctor C. W. Stiles.

Mr. Quaintance then read his address as retiring President as follows:

ANNUAL ADDRESS OF THE PRESIDENT.

REMARKS ON SOME OF THE INJURIOUS INSECTS OF OTHER COUNTRIES.

By A. L. Quaintance.

Our knowledge of the injurious insects of the world at large with the exception of Europe and one or two other regions, is, on the whole, quite meagre. During the past decade or so, it is true there has been a notable increase in the attention given by governments to the subject of economic entomology in their respective territories, and numerous publications are now appearing, dealing with the insects noxious to crops, forests, domestic animals, etc. and especially to man himself. The importance of such work in general has been perhaps the more quickly appreciated in view of the numerous brilliant discoveries in the field of medical entomology, which from the start have been of the greatest practical value. The economic investigations along various lines, now well under way, or but recently begun in many lands, will in due time make known the more noxious species with which the people of other countries have to deal.

The extent to which work of this kind has been undertaken may be judged by citing some of the countries where economic work has been or is now in progress, as Japan, Java, Straits Settlements, Fiji, Australia, New Zealand, South Africa, Natal, British East Africa, India, Ceylon, Egypt, Turkestân, Chile, Brazil, Argentina, Uruguay, Peru, British Guiana, the West Indies, Mexico, etc.

In view of our constantly increasing commerce with other nations, knowledge of their insect pests is of prime importance, as enabling us to better guard against their introduction. Aside from practical considerations, however, much scientific interest attaches to the biologic and other features of economic investigations in other countries, which contain much of inspiration and suggestions for us. The writer personally has felt the need of a greater familiarity with the destructive insects, occupying the attention of entomologists abroad; and in the belief that this feeling may be shared, to some extent, by members of this society, he has brought together for your consideration tonight condensed remarks on some of the insects which attack crops outside of North America.

Without doubt reference will be made to insects which really do not merit mention on account of their economic importance, and

species will have been omitted which should have been mentioned. It has not been possible to so thoroughly review the literature as to be reasonably sure even; of including all of the prominently injurious species, and it has often been impossible to decide upon the proper economic status of a species from the authors' remarks. These details, however, lose some of their importance when we remember that the behavior of a given species in its natural habitat does not necessarily warrant the conclusion that it would be equally or more injurious if introduced into another country, though the assumption that it would, under a new environment, maintain, or even surpass, its reputation as a pest, is unquestionably a safe one. Of special importance, however, is a knowledge of the food habits and life history of a species, which considered in connection with its original habitat and systematic position, furnish adequate grounds for conclusions as to its probable dangerous or innocuous character.

Time does not permit to dwell on the many interesting questions related to a subject of this kind, which, of itself, is too large to properly be considered in an address of this character. For instance, it would be of much biological interest, and of very probable practical value to summarize our knowledge as to what extent insects from other Zoölogical regions, as the Oriental, Neotropical, Ethiopian, etc. have adapated themselves in the Nearctic and in what life zones in North America they thrive and prove noxious. As is well known, Palearctic forms, especially European, constitute the bulk of our imported injurious pests, though many exceptions must be noted.

ISOPTERA.

Practically none of the Neuropteroid orders of insects are injurious to crops, with the exception of the Isoptera, which contains two families, many species of which are at times plant enemies, but especially of houses and other wooden structures.

The well known *Termes lucifugus* of Europe is a pest of buildings also attacking garden crops.

Termes obesus Ramb. is probably the species responsible for the large amount of damage in India to houses, crops and trees. In Ceylon *Calotermes militaris* Desn. and *C. greeni* Desn. are periodically pests of the tea plant. *Termes lacteus* Frogg. is destructive to buildings about Sydney, and in the woods, builds tall rounded nests or mounds, some of them 6 feet high. *Coptotermes gestroi* Wasm. is destructive to numerous plants in tropical Asia, as *Hevea brasiliensis*, mango, coco nut palm, etc.

In Formosa, *Termes vulgaris* Hav. is very destructive to sugar cane, the insects eating the roots and parts below the soil, often

killing the young plants. In Turkestan *Hodotermes turkestanicus* is noted for injuries to telegraph poles.

ORTHOPTERA.

Representatives of this order have been scourges to mankind from the earliest times, and accounts of their ravages occupy prominent places in entomological literature. All families, save one, contain injurious species, but the following especially merit notice.

Locustidæ (*Acridiidæ*).

Schistocerca paranensis Burm. is the destructive locust of Argentina and surrounding regions of South America. Its distribution is given as Argentina, Brazil, Uruguay and Chile. *S. tartarica* L. (*C. peregrinum* Stal.), a similar species, and with which the above has been at times confused, is an insect of the greatest importance in northern Africa, and western Asia. It occurs in southern Europe and is recorded from South and Central America. In the Sudan this species is stated to be the most important of all insect pests to crops.

Orthacanthacris ægyptia L., the *Acridium ægypticum* of some authors, ranges over southern Europe, northern Africa and western Asia. Its history as a devastating species is too well known to require comment. Another important form, *Calliptamus italicus* L., ranges as far north as central Europe, and also inhabits northern Africa and western Asia. *Dociostaurus moroccanus* Thunb., periodically swarms over Algeria, living permanently in the higher altitudes. This species ranges over about the same distribution as the foregoing, and also occurs in Madeira.

Colemania sphenarioides Bol., the so-called "Jolo Grasshopper," and *Hieroglyphus banian* Fab. are first class enemies of cereals, rice, etc. in Mysore State, the latter occurring also in China and India. In Formosa *Oxya intricata* Stal and *O. velox* Fabr. are destructive enemies of rice, and *Gelastorhinus esox* Burr. does similar injury in Formosa, and also in Japan.

Cyrtacanthacris septemfasciata Serv. is the plague locust of Natal, central and southern Africa, and is present in Borneo. This species particularly was the cause for the foundation of the South Africa Central Locust Bureau. Another species, the brown locust of South Africa, *Locusta pardalina* Walk. is also a pest of prime importance. Some other species merit mention almost equally with the foregoing.

Anent locust ravages in northern Syria, it was stated in the daily consular and trade reports that the commission appointed by the government required every rural inhabitant to collect and

deliver at least 55 pounds of locust eggs. In this way a total of 629,882 pounds of eggs were collected.

Achetidæ (Gryllidæ).

In this family are several species frequently noted in economic literature. The mole cricket of the West Indies, *Scapteriscus didactylus* Latr., is excessively injurious to tobacco, sugar cane and various other crops in Porto Rico. It is present in various islands of the West Indies, and occurs in South and Central America and in Mexico. Its presence in the southern United States is a well established fact.

Gryllotalpa africana Beauv. is recorded from Asia, Africa, Australia and New Zealand. In Uganda and Formosa, it is said to be extremely injurious to rice. *Oecanthus pellucens* Scop. occurs in southern and central Europe, western and central Asia. It punctures grape canes and stems of other plants like our *O. nigricornis*.

Acheta bimaculata DeG., in Formosa, is very injurious to young vegetation of various kinds, especially cotton, tea, etc.

THYSANOPTERA.

There are many species in this order which have shown themselves in the United States and elsewhere to be formidable enemies of crops, as *Euthrips pyri*, *E. citri*, and *Thrips tabaci*. The habits of these insects, in some cases, are quite favorable to their dissemination from one country to another, and numerous species are already widely scattered over the world.

Limothrips denticornis Haliday occurs generally over Europe, and infests oats, barley, and various fruits. *L. cerealium* Haliday, the so-called corn thrips, is distributed over all Europe. It is considered by Uzel as one of their more destructive species, injuring corn, wheat, oats and grasses, the attack causing the grains to shrivel and become abortive. *Heliothrips hæmorrhoidalis* Bouché, a species which Bouché thought to be native to America, is widely distributed over Europe and occurs in Australia. It is destructive to numerous plants, and is one of our more injurous forms. *H. rubrocinctus* Giard, the cacao thrips, is spread over the West Indies, where it is one of the prime enemies of cacao, attacking the pods, tender shoots and foliage. It also injures the cushew, guava, mango, etc. and is recorded from Uganda. The insect has recently made its way to Florida.

Thrips communis Uzel, in Bohemia, injures potatoes and beets, where it is regarded as quite destructive. *T. flava* Schr. injures blossoms ot pear, apple, plum, cherry, etc. and occurs on vegetables. In England, this species with *T. physopus* L. are known as pear

thrips. The former species occurs in widely separated regions in Europe and is probably generally present over the entire region.

T. minutissima L., present in England, Germany and Bohemia, is another general feeder like *flava* and has about the same distribution. *Thrips sacchari* Krueger with *T. serrata* Kobus attacks sugar cane in Java. *Stentothrips gramineum* Uzel is injurious to barley and other grains in Bohemia, while *Drepanothrips reuteri* Uzel is injurious to grape foliage in Sicily, especially to certain American varieties (Riparia). *Phloeothrips oleæ* Costa is one of the important olive pests in portions of Europe, injuring the fruit and foliage. *P. pallicornis* injures sugar cane in Formosa.

It is apparent that our knowledge of the injurious Thysanoptera is confined mostly to Holarctic forms. It is quite certain that other regions will furnish many species which, in their present or new environment, will be quite troublesome.

HEMIPTERA.

Species of the order Hemiptera are of especial interest to crop producers, for the sum total of losses for which they are responsible, would amount to no small part of that chargeable to insects as a class.

HETEROPTERA.

Pentatomidæ.

Two species of the genus *Eurydema*, namely, *ornatum* L. and *oleracea* L. are pests of cruciferous plants in Europe, and much resemble in habits and general appearance our harlequin bug. The former species occurs over most of Europe, Asia Minor, parts of Russia, Turkestan, etc. The latter is even more widely distributed and is recorded from all of Europe, Western Russia, Turkestan and Siberia.

Several species, assigned to this family, are important in Australia, as *Stilida indecora* and *Rhoecocoris sulciventris*, which, both in the immature and adult stages swarm over orange orchards, sucking sap from branches, causing the fruit to fall. *Biprorulus bibax* is also an orange pest and is known as the spined orange bug. *Philia basalis* is one of the common fruit bugs of North Queensland, and the so-called cherry bug, *Peltophora pedicillata* ranges from New South Wales to North Queensland. A similar species, *P. picta* Germ. also punctures cherries, causing the fruit to fall. In South Africa, *Bagrada hilaris*, the Bagrada bug, injures cruciferous plants like our *Murgantia histrionica* Hahn. This insect occurs over central Africa, Algeria and the Arabian Desert. *Bagrada picta* Fabr. also infests cruciferous plants in India. *Plantia affinis* Dallas infests growing rice in New South Wales.

Aenaria lewisi Scott does much damage to rice in Japan by piercing the heads. The insect is single brooded, the adults hibernating under trash in field and woodlands. *Cuspicora simplex* Walker the brown potato bug, and *C. virescens* Tryon, are potato pests in the Illawarra and Toowoomba districts of Australia.

Coreidæ.

In this family are several important species, though but few are seriously destructive. One species, the rice or paddy bug, *Leptocorisa varicornis* Fabr., is a serious pest to rice, ranging over Japan, China, India, Ceylon, Philippine Islands, etc.

Mictis profana, the crusader bug, is abundant in citrous orchards in Victoria and punctures the shoots, blighting the twigs, often causing the crop to fall.

Lygæidæ.

Nysius vinitor Bergroth, the Ruthergren bug of Australia, punctures fruits, as grapes, peaches, and the like, causing them to rot, and is considered one of the most destructive plant bugs on that continent, swarming over fruit and foliage in countless millions.

Oncopeltus quadriguttatus, the cotton bug, is common on cotton in the Richmond River section and ranges from Sydney to Queensland. *Oxycarænus lætus* Kirby is a cotton pest in many parts of India. Only twelve days are required from egg to adult.

Pyrrhocoridæ.

This family is of interest principally on account of several members of the genus Dysdercus, which contains species quite injurious to cotton in various parts of the world. There are some four or five Nearctic species and a single one from the Paleartic region, *D. crucifer* Stal occurring in Japan, the Philippines, etc. Some twenty species occur in the West Indies and South and Central America.

Dysdercus sidæ infests cotton in New South Wales, staining the cotton fleece with its excrement, in common with the other forms of the genus, which seem always to infest cotton when grown within their range of distribution. *D. cingulatus* Fabr. is abundant on cotton in India, while *D. fasciatus* Sign. is the cotton stainer bug of South Africa, occurring also in Portuguese East Africa. Another species, *D. superstitiosus* frequents cotton on the Cape. *D. insularis* and *D. pacifica* occur on cotton in Fiji, but have not as yet caused much trouble. Certain species are pests to the south of us, i.e., *D. ruficollis* L., in Peru; *D. howardi* Ballou, considered quite important in Trinidad and Tobago; and *D. andreæ* L. in Cuba. *D. delauneyi* Leth. is common in the Southern Islands. The harle-

quin bug of Australia, *Dindymus versicolor*, is a Pyrrhocorid and punctures ripe fruits.

Tingitidæ.

Urentius echinus Dist. occurs on egg plants in India, though not as yet troublesome. The olive tree bug, *Froggattia olivina*, of New South Wales, has turned its attention from the wild to the cultivated olives, sometimes defoliating the trees. *Stephanitis (Tingis) pyri* Fabr., which inhabits Europe, Asia Minor, Russia, Japan, etc., is injurious to foliage of pear and is mentioned in most European works on economic entomology.

Capsidæ.

In this extensive family, the species mostly live on plants and a few are of importance. The famous mosquito blight of tea in India and Ceylon is due to *Helopeltis theivora* Waterhouse while *H. bradyi* Waterhouse injures cacao in Java. *Disphinctus politus* Walker attacks the betel vine and *D. humeralis* Walker injures Chincona, in India. *Gallobellicus crassicornis* Distant, is a garden pest in Bombay, and in Pusa, attacks and breeds on tobacco.

Calcoris angustatus Leth. attacks sorghum in South India. *C. trivialis* Costa injures the olive, vegetables, etc. in portions of southern Europe, and is present over northern Africa.

HOMOPTERA.

Cercopidæ.

The Cercopidæ, though not numerous in species, are widely distributed over the world, though not many are troublesome to crops.

Tomaspis varia Fabr., the sugar-cane frog hopper, is just now attracting considerable attention in Trinidad and Tobago. The young feed on roots of the sugar-cane plant, following these in cracks in the soil, and the adults feed on the the leaves. *T. postica* Walker occurs on sugar-cane in Mexico. *Philænus spumarius* L. injures the sugar beet in Bohemia. *Ptyelus costalis* Wk. is a pest of rice and sugar cane in Formosa.

Jassidæ.

This family has been but little worked in the newer parts of the world, though a few important species are to be mentioned as crop pests. *Nephotettix apicalis* Motsch. is a serious enemy of rice in seed beds in Japan and Formosa, and has caused a loss of $10,000,000 in a single year. The species ranges over Japan, China, Cey-

lon, the Philippines, etc. Another Jassid injuring rice in India is *Tettigoniella spectra* Dist. Three species of *Idiocerus* injure the shoots of mango in Saharanpur, namely, *I. clypealis* Leth., I. *niveosparsus* Leth. and *I. atkinsoni* Leth. *Chloritia* (*Eupteryx*) *solani* Kollar is the potato frog fly of England, as stated by Miss Omerod. *Thamnotettix fuscovenosus* Ferr. occurs in Italy, Corsica, Greece, Austria, etc., and in some regions injures the olive. *Typhlocyba viticola* Targ. injures the grape in Italy, as does *flavescens* in northern Africa. In Bohemia several species of Jassids injure the sugar beet, as *Cicadula sexnotata* Fall., *Eupteryx atropunctata* Goeze, etc. *Zygina subrufa* Motsch., *Deltocephalus dorsalis* Motsch. and *Strongylocephalus agrestis* Fall. attack rice and sugar cane in Formosa, the latter species injuring the same crops in Japan.

Fulgoridæ.

A notorious species in this family is *Perkinsiella saccharicida* Kirk., the sugar-cane leafhopper, which, on account of its injuries, led to the establishment in Hawaii of the Entomological Division of the Sugar Planters' Experiment Station. The pest is thought to have been introduced from Australia, and is known to occur in Java. Several other species injure sugar cane, as *Phenice moesta* Westw. and *Pyrilla aberrans* Walk., in India, and *Delphax saccharivora* West., which some years ago was troublesome in the West Indies. *Liburnia* (*Delphax*) *psylloides* Leth. injures corn in Ceylon and India. *Ricania zebra* Dist., in the same region, infests rice and grasses.

Hysteropterum grylloides Fabr. infests the olive, in Italy, and is general over all of southern Europe. Another European form is *Hyalesthes obsoletus* Sign. injuring young olives. *Dictyophora pallida* Dor. is the sugar cane fly of India, and is common in the Punjab, United Provinces, and Behar. Cane is said to be its only food plant.

Psyllidæ.

The injurious members of this family are mostly of the genus Psylla, and numerous forms of decidedly economic importance occur in the Palearctic region. Thus, *Psylla mali* Schmidbg. ranges pretty well over Europe, and is a decided pest of apples. In England it is known as the apple sucker, where it is considered one of the worst of all pests to this plant. *P. cratægi* Schr. occurs over Europe generally on apples and *Cratægus*. *P. pruni* Scop. is also distributed over much of Europe, including Siberia. It attacks plum and prunes. *P. pyri* L. occurs on pear and has about the same distribution as the foregoing. *P. pyrisuga* Forst., also attacking pear, occurs over much of Continental Europe, and is

also found in Japan. In France it is known as the orange Psylla on account of injuries to oranges. *P. cistellata* Buckton causes galls on mango in Dehra Dun. *Trioza obsoleta* Buck. attacks the persimmon in Thana and a species of this genus injures the young growth of citrus trees in South Africa, where it is known as the citrus Psylla. *Mycopsylla fici* is found on native figs in Australia. the larvæ hiding under the abundant milky sap which exudes from the punctures made. *Homotoma ficus* L. attacks the foliage of fig in Italy, the species being present also in Spain, France, Dalmatia, etc. The olive Psyllid, *Euphyllura olivina* O. Costa injures the olive and has about the same range as the preceding species.

Aleyrodidæ.

The Aleyrodidæ is a family of wide distribution in the temperate and tropical parts of the world. Many species have already attracted attention by their injuries and a few constitute quite destructive pests. *Aleyrodes citri* and *A. vaporariorum* may be cited as examples of very undesirable introductions already effected.

Two species injure tobacco, namely, *Aleyrodes tabaci* Gennadius, in Greece, and *A. nicotianæ* Maskell in Mexico. Sugar cane in Java is attacked by three species, namely, *Aleyrodes bergii* Signoret, *A. longicornis* Zehntner, and *A. lactea* Zehntner. The guava in Brazil is infested with *Aleyrodes horridus* Hempel and *A. goyabæ* Göldi. *Aleurodicus cocois* Curtis is a guava pest of importance in Trinidad, Venezuela and Brazil, and has long been known as troublesome to cocoanut palms in portions of the West Indies. A closely related species, *A. destructor*, seriously infests this plant in the Philippines.

In Europe, *Aleyrodes brassicæ* Walker has long been known as more or less destructive to cabbage, kale and other members of the cruciferous family. *Aleyrodes youngi* Hempel seriously infests cabbage in Brazil. *Aleyrodes ribium* Douglas occurs on red and black currants in England. Many other species might be mentioned as of possible or actual economic importance in foreign countries.

Coccidæ.

The Coccidæ, as a family, is of the greatest economic importance. The mode of life of the species favor their wide dissemination, and very many are now practically cosmopolitans. In this family especially it is difficult to surmise the behavior of a species introduced in a new environment, with abundance of food, etc. Mr. Sasscer has kindly assisted me in the selection of a few forms, not yet found in North America, and which are evidently of importance in their present range of distribution.

Icerya seychellarum West., attacks sugar cane, guava, palms, citrus etc., and occurs in New Zealand, China, Madeira, Mauritius, etc.

Phenococcus oleæ Marchal, is an olive pest in Tunis.

Pseudococcus sacchari Ckll. infests sugar cane in Cuba, Porto Rico, South America and probably elsewhere.

Pseudococcus perniciosus Newst. & Wilcox is a mealy bug very injurious to the lebbek in Cairo, Egypt, where the tree is grown for shade. It also occurs on the Christ's Thorn and Sunt.

Coccus (*Lecanium*) *viride* Green., the so-called green bug of Ceylon, infests a long series of useful plants, but is especially destructive to coffee. Its ravages to this crop have been practically responsible for the abandonment of its cultivation over the greater part of the planting districts of Ceylon.

Lecanium krügeri Zehnt., attacks cane in Java.

Three species of *Chionaspis* are Javanese cane pests, namely, *C. depressa* Zehnt., *C. sacchari-folii* Zehnt. and *C. madierensis* Zehnt.

Parlatoria pyri Marlatt occurs on pear and apple in Manchuria. From its affinities, it must be regarded as a suspicious character.

Aspidiotus oceanicus Lindinger is a pest of the coconut in the South Sea Islands, and *A. lauretorum* Lindinger, in the Canary Islands, infests a long list of plants, including Smilax, Hedera, Laurus, etc. *A. destructor* Sign., of very wide distribution outside of North America, occurs on the banana, coconut palm, tea, mango, and many other useful plants. *A. sacchari* infests sugar cane in Java.

Aspidiotus africanus Marlatt, of South Africa, is seriously destructive to the privet and fig, and infests, to a less extent, other cultivated plants, as apricot, quince and apple. It is also abundant on honey locust and pepper tree.

Leucaspis japonica Ckll., occurs in Japan, China, and South Africa, infesting apple, pear, maple, magnolia, etc.

LEPIDOPTERA.

In this order, practically all of the families contain species more or less important economically, though the actual number of families containing notably destructive forms is much less.

Nymphalidæ.

Brassolis isthmia Bates, the cocoanut palm butterfly is a troublesome enemy of its host plant in the Canal Zone.

Lycænidæ.

Virachola isocrates Fabr., in India, works havoc in pomegranate plantations and also injures guavas. *Zizera labradus* Godt. has

come into notoriety in Victoria by reason of its injuries to beans and peas. *Thecla pruni* L. injures plums in portions of Europe, but is not of much importance.

Hesperiidæ.

Three species of this family are noted as destructive in India. Larvæ of *Gangara thyrsis* Mo. are injurious to palms. The rice skipper, *Parnara mathias* Fabr. is at times destructive to rice, there being two broods on rice during the rains. *Telicota palmarum* Mo. occurs on date palm, and in widespread in India.

Castniidæ.

A single species of this interesting South American family is to be noted, namely, the giant sugar-cane borer, *Castnia licus* Drury. It is quite destructive to sugar cane in British Guiana. It has been collected in various localities in the northern half of South America and also in Nicaragua, Costa Rica and Trinidad, where it also attacks the banana. This species is also reported from Surinam. The larvæ tunnel the canes, producing the so-called "dead heart."

Notodontidæ.

Phalera bucephala Steph., the buff-tip moth, in England, is troublesome to many shade and fruit trees, including nuts. It occurs over Europe, except the polar region, Siberia, etc.

Thaumetopæidæ.

A single species, *Thaumetopæa processionea* L., the so-called procession caterpillar of Europe is here to be noted. These caterpillars defoliate oaks, hard wood trees, and even attack field crops, as potatoes, beans, flax, etc. The species is evidently quite important to forests, and is interesting on account of the habits of the larvæ, which, after they are about half grown, return after feeding, to definite localities on the tree trunk, usually a depression or other deformity.

Lymantriidæ. (Liparidæ).

To this family belong some of our most notorious injurious insects, namely, the gipsy and brown-tail moths, tussock moth, etc. Here also belongs the famous "nun" moth of Europe, *Lymantria monacha* L. The caterpillars are polyphagous, but especially frequent coniferous and hard wood trees. This species, judging from literature, is one of the highly injurious European insects. The "nun" moth ranges over central and northern Europe, except the polar region, northern Italy, Greece, Japan, etc. Another

polyphagous species is *Porthesia similis* Fuessl. with about the same distribution as *L. monacha*. It is often very destructive to fruit trees. *Euproctis subflava* Brem. is very destructive to fruit trees of all kinds in the Punjab, and probably elsewhere over its range, in Japan, Corea, portions of China, Usuri, etc.

Dasychira pudibunda L. is also a species of unsavory reputation in Europe and widely spread, occurring in central and northern Europe, Japan, China, etc. *Orgyia gonostigma* F. should also be mentioned in this connection and has about the same range as *D. pudibunda*. In New South Wales, *Teia anartoides* Walker is regarded as a serious pest, feeding on Acacias, roses, cherry, etc. *T. contraria* Walker, the bag shelter caterpillar, is reputed to kill stock, the hairs of the caterpillars being eaten in grazing, cause ulcerations of the mucous membranes.

Lasiocampidæ.

Malacosoma neustria L. makes its tents on various plants, as oak, elm, fruit trees, roses, etc., occurring pretty generally over Europe except the polar region, and is present in western Asia, Siberia, China, Japan, etc. *Gastropacha quercifolia* L., spread over Europe, is at times of importance to fruit trees, as is *Pæcilocampa populi* L. and *Odonestis pruni L. Lasiocampa trifolii* Esp., occurs on clover, etc., in Europe and occurs also in England, and portions of Asia Minor.

Noctuidæ.

This large family, as would be surmised, contains many highly injurious forms in different parts of the world.

Charæas graminis L. is from time to time very abundant and destructive to meadows in portions of Europe, the larvæ eating the roots of grasses. It is usually noted in devastating numbers in the mountain districts.

Mamestra composita L., the army worm of New Zealand, seriously injures various grains and grasses. *Dianthoecia compta* occurs over central and southern Europe, and includes in its food violets and carnations. *Diloba cæruleocephala* L. injures cherry, plum and apple in England, occurring also in Europe and Asia Minor. *Hadena brassicæ* L. has a wide range, as Europe, Siberia, Japan, India and South America. *Prodenia littoralis* Bdv. is a serious pest of cotton in Uganda, Cape Colony, and Egypt, and occurs in the Canaries, Asia, Central America, etc. *Gortyna ochracea* Hubn. mines the stalks of Irish potatoes in Ireland, and occurs over central Europe, in Italy, Russia, Corsica, etc. *Nonagria inferèns* Walk. bores the stems of rice in Formosa, while *N. uniformis* Dgn. is the cause of much complaint in India during the cold weather from its boring of wheat stems. *N. exitiosa* Oll. is said to be

the most destructive of all pests of sugar cane in New South Wales. *Spodaptera mauritia* Bdv. appears in great abundance on rice and grasses during the rains, or soon after, in India and has also been reported as quite destructive to Batangas rice fields in the Philippines. It is known as a pest also in Borneo. This species also attacks tobacco and vegetables. *Calamistis fusca* Hamp. (generally referred to as *Sesamia*) is a first class pest of corn in the Transvaal, Natal, Cape Colony, Rhodesia, etc., while *Sesamia cretica* Led. is one of the worst of all pests to corn and sugar cane in Khartoum. It ranges over Egypt, southern Europe, Asia Minor, etc. The larvæ bore into the stems of the young plants, later attacking the ears of corn.

Tæniocampa incerta Hbn. feeds on apple foliage and fruit in England; willow, oak and sloe are, however, its normal food plants. The species is distributed over much of Europe, Siberia, etc., and is recorded from North America. Two species of *Xylina*, namely, *ornithopus* Rott. and *socia* Rott. injure plums in Europe and have a wide distribution in the Palearctic region. In India, *Heliothis assulta* injures tobacco. In the same country the green shoots of the egg plant are bored by *Eublemma olivacea* Walk. *Thalpochares scitula* Rmbr. is noteworthy among Noctuids as feeding on scale insects in Italy. *Plusia chalcytes* Esp. feeds on foliage of peas, beans and potatoes in Australia, while *P. agramma* Guen. feeds on Cucurbits in India. *P. nigrisigna* Walk. is also a common pest in India, feeding on lucerne, peas, etc. *Cirphis leucosticha* Hamp. is the East African cob worm and eats the ears of corn, as does our common bollworm (*Heliothis obsoleta*). *Diparopsis castanea* Hamp. is the Sudan cotton bollworm, where it was probably introduced. It is also known from Beira, Delagoa Bay and Uganda. *Sacododes pyralis* Dyar, an allied species of South America, has similar habits. Larvæ of *Ontoptera intricata* Walk. are said by French to be the most destructive of grass-eating grubs known to him. The females lay from 500 to 700 eggs each. Larvæ construct tunnels which they leave at night to feed. *Naranga diffusa* Moor is a pest of rice and grasses in Formosa.

One group, of the Noctuidæ, (*Aphiderinæ*) contains several highly interesting and destructive forms, from the habits of the moths of piercing with their especially adapted probosces, ripe fruits, in order to feed on the juices.

Mænas salaminia Fabr. occurs in portions of Australia, as does *Orthreis fullonica* L. and is further distributed to Africa, India, Ceylon and the New Hebrides. *Argadesa materna* L., *Cosmophila erosa* Hbn., *Egybolia vaillantina*, *Sphingomorpha chlorea*, *Ophiusa lienardi* are other names for fruit piercing moths mentioned in literature as troublesome in Australia or South Africa. *C. erosa* is also recorded from the United States.

Agaristidæ.

A single Agaristid is to be noted. *Phalænoides glycine* Lewis, a serious vine pest in Victoria, where it may have been introduced.

Geometridæ.

Cheimatobia brumata L., known in England as the winter moth, is a fruit pest of importance in Europe. The larvæ feed on most forest trees (except conifers), hedgerows, etc. The insect strongly resembles our American canker worms, the females being wingless. This species ranges over central and northern Europe, southern and western Russia, Greenland, etc. *Chlorolystis rectangulata* L. is the so-called green pug moth, occurring pretty well over Europe. In Ireland it is troublesome to apples. *Abraxas grossulariata* L., the magpie moth, is especially troublesome to the currant, though fruit trees are attacked. Its distribution is very wide, as Europe, Siberia, China, etc. *Hibernia defoliara* Clerck is often damaging to fruit and other trees in Europe and is generally referred to in European textbooks. *H. rupicapraria* Hb. is also of wide distribution, and apparently of about the same importance. *Anisopteryx æscularia* Schiff. is an orchard pest in Europe, and is England is called the March moth. Its usual food is white thorn and black thorn, but it infests oak, elm, maple, etc. *Biston græcarius* Stgr. is a pest of forage plants and occurs in Italy, Greece, Macedonia, etc. *Biston suppressaria* is a caterpillar pest of tea, injuring this plant periodically in India. *Hemerophila atrilineata* injures mulberry seriously in Japan, interfering with the silk industry.

Cymbidæ.

Earias insulana Bvd. is the Egyptian cotton bollworm, or the spotted bollworm of India, causing a yearly loss in the former region of about $5,000,000. It attacks most malvaceous plants. It is recorded from North and South India, Burma, Siam, Australia, Mauritius, Uganda, etc. *Earias faba* Stoll, also known as the spotted bollworm, has similar habits, though in India it is more abundant than the former species. The larvæ bore into cotton bolls and feed on the oily seeds. In the absence of bolls, the shoots are tunnelled. In warmer parts of India the insect may go through its life cycle in about thirty days, and they are active throughout the winter.

Zygænidæ.

Levuana iridescens Bet.-Baker, the coconut leaf moth, has for many years been a destructive insect enemy of the coconut and Royal palm in Fiji. It is apparently yet limited to these Islands.

Sesiidæ.

Sesia myopæformis Bkh. infests the trunk and branches of apple trees in Europe, as does *S. pyri* in North America. *Trochilium crabroniformis* Lewin is injurious to osiers, the larvæ boring the stumps. It is recorded from England, Germany, Austria, etc.

Cossidæ.

Cossus cossus (*ligniperda*) L. bores the trunk, limbs and branches of shade, park and forest trees, as well as orchard trees. According to Taschenberg 266 larvæ were taken from one pear tree, while from 20 to 30, in individual forest trees is usual. The species is widely distributed, as much of Europe, Syria, Korea, etc. A near relative, *Zeuzera pyrina* L. is now established in the United States. *Z. coffeæ* Nietn. bores coffee stems in India, while *Cossus tristis* Drury bores the wood of apple and quince in South Africa.

Hepialidæ.

Hepialis lupulina L., the garden swift moth of England, does great damage to roots and stalks of plants, as well as bulbs and corms. The larvae attack also the strawberry. It occurs over central Europe, Scandinavia, Italy, Dalmatia, etc. *Hepialus humuli* L. is a pest of the hop plant, the larvæ tunnelling the roots. It occurs pretty well over northern and central Europe. Larvæ of *Charagia lignivora* Lewin bore apple-trees in Victoria, while in Australia larvae of *Pielus hyalinatus* and *P. imperialis* live in the roots of trees.

Pyralidæ.

Chilo simplex Butl., *C. zonellus* and C. *partellus* Swimb. are pests of cane, corn, sorghum, grass, etc. in India and Formosa, as is *C. fuscatellus* Sn. in Java. The larvæ bore the stems of the plants. *Diatræa striatalis* Snellen bores sugar cane in Java, like our *D. saccharalis*, and is one of their most important pests. A related, or perhaps the same species, *D. auriflua* Zell. similarly injures cane in India. *Diatræa canella*, *D. lineolata* with *D. saccharalis* injure sugar cane in Trinidad. *Heterographis bengallela* Rag. tunnels the fruit of the custard apple in the region of Calcutta and *Euzophera perticella* Rag. is a wide-spread pest of the egg plant in the plains of India, the larvæ boring the lower stems, while another species, *Leucinodes arboralis* Guen. infests the fruit. *Nephopteryx rubrigonella* Rag. is the pear fruit borer of Japan and is very destructive to this crop. *N. sagitiferella* Moore, similarly bores citrus fruits in Perak and the Malay Archipelago generally. *Phycita infusella* Meyr is widely spread over India, and is known as the cotton bud moth on account of its injuries to cotton. *Nymphula depunctalis*

Dup. is common in India and feeds on foliage of rice. The larvæ make cases of leaves and are able to live either in air or water. *Godara comalis* Guerin, infests, in Australia, the leaves of turnips and horse radish, and in the same country *Conogethes punctiferalis* Guerin, attacks ripening peaches, eating into and webbing over the surface, and pupating at the pit. *Dichochrosis punctiferalis* Guerin is quite injurious to castor beans in India, the larvæ boring into the stems and seeds, often causing much loss. *Pyrausta nubilalis* Hb., ranging over central and southern Europe, Asia Minor, southern India, etc., is destructive to hops in Europe, the larvæ boring the stems of the plants. *Scirpophaga intacta* Sn., in Java, injures sugar cane, the larvæ boring the terminal roll of leaves and also the stem. *Sylepta derogata* Fabr. and *Phycita infusella* Meyer, are both cotton pests in India, the former feeding on the leaves, which it rolls, and the latter on the buds of the shoots, folding the young leaves together, which renders its detection easy. *Glyphodes indica* Saund., which much resembles our melon caterpillar, has in India about the same habits, the larvæ defoliating melon and allied plants. *Micromima olivia* in Cuba rolls and eats the leaves of tobacco in the seed beds, attacking also the egg plant.

Tortricidæ.

This family contains some of our most destructive insects and species of importance in other countries should be looked upon with suspicion.

Omphisa anastomosalis Guen. is quite destructive to sweet potatoes in Formosa and has recently been introduced (1900) in Hawaii, the larvæ boring the roots and tubers. *Capua angustiorana* Haw., the small apricot and vine moth, is destructive to these crops in England. It occurs over central and western Europe, in Asia Minor, northwest Africa, etc. *Tortrix excessana* Walker, native to New Zealand, injures the foliage and fruit of the apple, the latter being tunnelled in all directions, and for this reason is known by some as the railway bug. *Tortrix ashworthana* Newm. (= *Cacœcia responsana*), in Victoria, bores into apple much like our *Carpocapsa pomonella*, with which it has been confused. This is regarded as a serious pest by reason of the character and amount of damage to apples. *Tortrix divulsana* Walker, (= *Tortrix glaphyrana*), the lucerne moth, is a regular pest in New South Wales, the larvæ feeding on and webbing together the tips of its food plant. *Pandemis ribeana* Hb., P. *heparana* Schiff. *P. podana* Sc. and related species in England infest various orchard trees often seriously. These are insects of wide distribution in the Palearctic region. *Clysia ambiguella* Hb. is one of the first class pests of grapes in France at the present time, the larvæ eating the blossom clusters, and later

boring into the berries. This pest has a wide distribution over Europe, except in the polar region and occurs in Asia Minor, India and Japan. Two species of *Olethreutes*, namely, *cynobatella* L. and *pruniana* Hb., are worthy of mention as injuring buds, young leaves and blossoms of orchard trees in various parts of Europe, working much like the bud moth, *Tmetocera ocellana* Fabr. now well established in the United States. *Polychrosis botrana* Schiff. corresponds to our grape berry moth *Polychrosis viteana* Clemens, and it was long supposed that ours was the European species. This latter ranks as a vine pest in Fance with *Clysia ambiguella*, earlier mentioned, and is widely distributed over southern Europe. *Notocelia roborana* Tr. infests currant fruit in England, at times seriously, the larvæ hollowing out the ripening fruit. It ranges over Europe, except the polar region. Several species of *Laspeyresia* (*Grapholitha*) in Europe are troublesome insects and would probably prove very undesirable introductions in the United States. Larvæ of *L. woeberiana* Schiff. bores the bark of cherry, plum, apple and peach trees. *L. funebrana* Tr., the red plum maggot of England, attacks fruit of plum in England and in the caterpillar state is said to be plentiful in plum pies. It would doubtless be very damaging to our prune industry on the Pacific coast. It occurs over central Europe, Scandinavia, Italy and Asia Minor. *L. dorsana* F. has about the same distribution and is of importance by reason of its injuries to peas. *Laspeyresia schistaceana* Sn. is an important sugar-cane pest in Java, the larvæ boring into the more tender shoots. *Carpocapsa splendana* Hb. is a serious pest of walnut and chestnuts in Europe. The normal food is said to be acorns. It occurs in central and southern Europe, Sweden, England, etc. *C. amplana* Hb. infests hazel nuts, walnuts, etc., etc.. occurring in Germany, Austria, northern and central Italy. The so-called Natal codling moth, a species of *Carpocapsa*, is a serious enemy of guavas, oranges and mandarines in that country. *Simæthis nemorana* Hb. infests figs, and occurs in southern Europe, Asia Minor, Madeira, Mauritius and is reported from Canada. *Paramorpha aquilina* Meyrick has come into notice as an orange pest in Australia. The larvæ bore through the skin and feed on the pith between rind and flesh. *Crytophaga unipunctata* Donovan is the cherry borer of Australia. The larvæ are said to be excessively destructive to cherry and peach trees, and some times to plums. Galleries are eaten under the bark, the larvæ later boring into the heart of the tree. *Amorbia emigratella* Busck, thought to be native to Mexico and Costa Rica, has recently appeared in Hawaii and is known as the leaf roller of sweet potatoes. It also attacks many kinds of shrubs and fruit trees.

Yponomeutidæ.

A few forms in this family require mention. *Yponomeuta malinellus* Zell. *Y. evonymellus* L. and *Y. padellus* L. are recognized as of considerable importance to orchardists in England and portions of Europe, especially the first mentioned, which has just made its appearance in the United States near Geneva, N. Y. *Y. padellus* feed on plum and cherry in France, and on plum in Italy. *Prays citri* Mill. infests the orange in Corsica, Sicily, Ceylon and Australia, and recently it has been received from the Philippines. *P. oleelus* F. injures foliage of olive in Italy, and ranges over the Mediterranean region, where the olive is cultivated. In the genus *Argyresthia* are several suspicious characters. *A. conjugella* Z. is already established in British Columbia and has been taken in the Puget Sound region in Washington State. The slender larvæ tunnel apples and other fruits. It ranges over central and southern Europe, Asia Minor, Japan, etc. *A. nitidella* Fabr. is the cherry fruit moth of England, the larvæ burrowing in the fruit. *A. ephippella* F. feeds on the shoots of cherry, the leaf and blossom buds of wild plum, also on the hazel. *A. cornella* F. attacks the leaf buds of apple.

Gelechiidæ.

Gelechia gossypiella Saund. is another serious cotton pest and is almost universally distributed over India, Ceylon, Burma, Straits Settlements and East Africa. It has just now been found in Hawaii. It is known as the pink bollworm, and is generally associated with the spotted bollworms. The larvæ also bore into the bolls and feed on the oily seed. *Anacampsis nerteria* Meyr. is injurious to ground nuts in Ceylon and South India, and is apparently quite important. *Anarsia ephippias* Meyr. also feeds on the ground nut in India and has been taken only during the rains. It feeds upon and rolls the leaves together.

Elachistidæ.

The pith moths, *Blastodacna hellerella* Dup., and *B. vinolentella* H. S. are insects whose larvæ cause a good deal of damage to apple trees, especially nursery stock. The larvæ bore into the buds, spurs and shoots, thus causing the foliage and shoots to die. The species work something like our *Epinotia pyricolana* Murtf. *Antispila rivillei* Stt. injures grape foliage like our *A. isabella* and occurs in northern and middle Italy and Dalmatia. *Coleophora anatipennella* Hbn. the cherry case bearer, injures cherry buds in the spring time in England and occurs over central and northern Europe. *C. flavipennella* HS. injures pears in Europe in a similar way, while *C. hemerobiella* Z. feeds on apple, pear and cherry,

Blastodacna atra Haw. is the apple fruit borer of Japan and is one of their most troublesome pests.

Lyonetiidæ.

Lyonetia clerkella L. mines apple leaves in Europe, but is not especially important on account of the character of injury. The species occurs over central and northern Europe, central Italy, Sardnia, etc. *L. prunifoliella* Hb. similarly mines plum and cherry leaves, and has a wider distribution than the former. *Cemistoma scitella* Z. mines apple and pear leaves, occurring over central and northern Europe, Dalmatia, Italy, etc. *Cemistoma coffeella* Perrottet is the coffee leaf miner of the West Indies. It has been introduced into Brazil and other coffee growing regions of the Western Hemisphere and does much damage to this crop. In Porto Rico, for example, it was held to have caused a loss of from $150,000 to $300,000 during 1904.

Tineidæ.

Incurvaria rubiella Bjerk., known as the raspberry moth in England, is important, the larvæ boring the shoots, thus lessening or destroying the crop. It is present in central and northern Europe, Corsica, Dalmatia, Russia, etc. *Incurvaria capitella* Clerk injures the fruit and shoots of the currant and ranges over central Europe, Norway, Sweden and Western Russia. *Gnorimoschema heliopa* Lower is a serious enemy of tobacco in India, Ceylon and Java, the larvæ boring the stems, causing gall-like swellings. *Ereunetis flavistriata* Walsm., is the Hawaiian sugar-cane bud moth, the larvæ also eating the dead leaves of palms, bananas, pineapples, and sometimes eating the skin of the banana fruit. The peach moth of Japan, *Carposina persicæ* Sasaki is one of the very destructive insects of this crop, more than 90 per cent being injured during some seasons.

DIPTERA.

Tipulidæ.

Several species of this family are referred to in European literature and are evidently of considerable importance. The larvæ of *Tipula oleracea* L. injure various root crops, as well as those of *T. paludosa*. *Pachyrhina maculosa* Meig. has a record of serious injury to tulip bulbs in England.

Cecidomyiidæ.

Dasyneura œnophila Haimh. is a gall maker on grape foliage, occurring in central Europe and the Mediterranean region. *D.*

pyri Bouché, the pear leaf curling midge is distributed over central and northern Europe, though it has as yet attracted but little attention by its injuries. *Asphondylia lupini* Silv. injures lupines in Italy, the maggots infesting and aborting the seed pods. This species was reared from its host by Coquillett at Los Angeles. *Mayetiola avenæ* March. injures wheat in southern Europe much like its cogener, *M. destructor*. *Contarinia nasturtii* Kieffer, the so-called "swede midge," infests swedes in Ireland, the maggots occurring at bases of leaf stalks. It occurs on various cruciferous vegetables in Europe. *C. gossypii* Felt infests the flower buds of cotton, causing the bracts to flare and squares to drop. This pest appeared in Antigua in 1907, and caused very serious losses at the time. It is apparently still confined to that Island. *Cecidomyia oryzæ* Wood Mason has been destructive to rice in Bengal. *Parricondyla gossypii* Coq. is a pest in Barbados, and is present in Montserrat. The red maggots occur under the bark of the stems of the cotton plant, which they may completely girdle, causing the death of the portion above the infested area.

Bibionidæ.

The larvæ of *Bibio hortulanus* L. live on the roots of various garden and other crops in Europe, the species also occurring in northern Africa and Asia Minor.

Syrphidæ.

The Narcissus fly, *Merodon equestris* Fab., in Europe, is injurious to bulbs of narcissus, daffodil and amaryllis. The species is now well established in British Columbia.

Anthomyidæ.

We have already received from Europe several of the injurious species of this family and other forms are yet to be introduced. *Pegomyia hyoscyami* Panz. infests the foliage of garden vegetable as beets and spinach, though apparently it is not of great importance at the present time. *P. betæ* Curtis, in England, is noted as of increasing economic importance and is just now doing a good deal of injury to beets. The larvæ attack the mesophyll of the leaf. There are two or even three broods each year.

Trypetidæ.

The Trypetid family of flies is one of almost world-wide distribution and contains many species of the greatest economic importance, as the so called fruit flies. These are especially destructive for the reason that thus far no remedies have been developed which

are of much value in lessening attack. With the exception of the *Rhagoletis pomonella*, no species is as yet notably destructive in the United States, though the notorious Mediterranean fruit fly, *Ceratitis capitata*, is well established in the Territory of Hawaii. Other dangerous forms are in the West Indies, some of them perhaps already established in South Florida. The family is especially rich in species in Africa, the East Indies and Australia, and in the latter country constitute a veritable scourge to certain crops.

Ceratitis capitata Wied., is now pretty well distributed over the tropical and subtropical parts of the old world and occurs in Australia, South Africa, Brazil, Burmuda, Hawaii, etc. It infests practically all soft fruits, and numerous sorts of vegetables. It is notably injurious to peaches, oranges and guavas, but infests several dozen other fruits, vegetables and wild fruits. *Ceratitis anonæ* Graham injures guavas and the sour sop, in West Africa, while *C. punctata* Wied. injures pods of the cacao in the same region. *C. catoirei* Guerin, considered by some identical with *capitata*, infests oranges in Mauritius. *C. rubivora* Coq., the Natal fruit fly, injures all sorts of cultivated fruits and is extending its range over South Africa. It apparently ranks as a pest close with *capitata*.

The genus *Dacus* also contains a consideration number of forms highly destructive. *D. tryoni* Froggatt, the Queensland fruit fly, infests the banana, mango, peach, nectarine, orange and most other fruits. It is evidently a pest of first importance and ranges from India and Ceylon to Java, Amboina and Australia. *D. ferrugineus* Fabr., the mango fruit fly, also infests oranges, mangoes and other soft fruits and occurs in India, Java and probably many of the Islands of Malaysia. It is thought to have been recently introduced in the Philippines. *D. cucurbitæ* Coq., the melon fruit fly of India, Ceylon and Hawaii, infests most disastrously cantaloupes and watermelons in its range of distribution. *D. bipartitus* Graham, a West African species, attacks especially curcubits, though it is not regarded as a serious pest as yet. *D. persicæ* Bigot, the peach fruit fly of India is very injurious to peaches, oranges, mangoes, etc. *D. psidii* Froggat is the South Sea guava fly, and is known from Fiji and New Caledonia. The Sudan fruit fly is also a *Dacus*, the species not yet having beein dermined apparently. *Dacus oleæ* Rossi is an old time enemy of the olive in the Mediterranean region, including northern Africa and the Canary Islands. It is one of the prime pests of the olive in its territory. The Baluchistan fruit fly, *Carpomyia pardalina* Bigot, is also a melon pest of importance. *Anastrepha serpentina* Wied. and related species infest guava sapadillos, etc., in the Lesser Antilles, while several species of this genus infest fruits in South America, as *A. striata, fratercula, serpen-*

tina, etc. *Anastrepha ludens* Loew is, of course, the principal pest of orange fruit in certain States in Mexico and was the occasion of the quarantine by California of Mexican oranges. *Trypeta musæ* Froggatt, the Island fruit fly, infests bananas and other fruits in the New Hebrides and has been introduced into Australia. *Acidia heraclei* L. occurs in Europe and Asia Minor, and mines the leaves of celery. *Platyparea pœciloptera* Schrank occurs over central Europe and is destructive to asparagus. The female fly deposits her eggs on the tips of the young shoots, the resulting maggots living beneath the skin and tunnelling towards the base of the plant. It remains to mention a fly of the family Lonchæidæ, *Lonchæa splendida*, present in New South Wales, Victoria, New Zealand and the Pacific Islands, which infests tomatoes, after the manner of fruit flies.

Oscinidæ.

The Oscinidæ include several species which in Europe are exceedingly troublesome to small grains. *Chlorops tæniopus* Meigen causes the affection known as "gout" on account of the swollen condition of the heads. The maggots are especially prevalent in barley, but are common also in wheat and rye. Another species, the *Oscinis frit* L., or frit fly, is especially abundant and injurious over northern Europe, attacking principally oats and barley, and constituing one of the most important pests of these crops. The maggots work in the stems of the host plants, about the level of the ground, causing these to wither and die. Injury by a second brood in the heads of these grains causes a blighting of the grains, producing the condition known in Swedish as "frits" from whence the name.

Oscinis theæ is sometimes injurious to tea in Ceylon, the maggots mining the leaves. A species of *Agromyza* mines the stems of peas in India, while still another form mines the leaves of cruciferous plants.

Coleoptera.

Byturidæ.

A single species in this family is regarded as quite troublesome in England, and occurs in France and Germany, namely, *Byturus tomentosus* Fabr. It attacks raspberries, and the greater part of the fruit is stated often to be injured and made unfit for market purposes. The beetles nip off the blossoms and the larvæ infest and feed upon the fruit. It will be recalled that our species, *Byturus unicolor* Say, infests raspberries in the same way, but is apparently much less important than its European cogener.

Buprestidæ.

Capnodis tenebrionis L., distributed over southern Europe, attacks *Prunus spinosa* L. and various fruit trees, working something like our *Chrysobothris femorata. Sphenoptera neglecta* Klug attacks cotton throughout the nothern Nile provinces, the larvæ hollowing out the stems.

A similar (perhaps identical) species, *S. gossypii* Kerr., injures cotton in the same way over the cotton area of India. *S. hypogea* is a serious enemy of peanuts in South India, the larvæ boring into the underground root stalks. *Agrilus grisator* Kerr. bores in lemon trees in the same territory, while the larvæ of *Belionata parasina* Thunb. is also common in India and bores the trunks of guava and mango plants. Small leaf-mining Buprestids, *Aphanisticus consanguineus* Rits. and *A. krügeri* Rits. attack sugar cane in Java, though the injuries have not been very important up to the present time.

Bostrychidæ.

Dinoderus minutus Fabr. is common in the bamboo in India, and has been reared from cut sugar cane. *Rhizopertha collaris* Erichson bores into the limbs and branches of the apple in Australia, and is regarded as quite troublesome. *Bostrychopsis jesuita* Fabr. is the orange and fig borer of Australia, though it attacks also lemon and apple. The female places her eggs just beneath the bark, and the larvæ tunnel the hard wood mostly longitudinally. On account of its borings, it has been called the augur beetle.

Scarabaeidæ.

An important European member of this family is the *Melolontha melolontha* L., the common cockchafer, or May-bug. It is injurious in both the larval and adult stages, the grubs feeding on the roots of grasses, vegetables and young trees, and the adults upon foliage of elm, oak, etc., often completely stripping the trees. Most European works on practical entomology give this species extended attention, perhaps more on account of its commonness than its real importance as a pest. In India, *Anomala varians* Oliv. is injurious to rice and other cereals, the larvæ feeding on the roots. *Anomala vitis* Fabr. injures the grape in Europe, Algeria and Tunis, the adults feeding on the foliage and the larvæ on the roots of the plant, and also on roots of various grasses. One of the very troublesome sugar-cane pests of Porto Rico is a species of *Lachnosterna,* the grubs of which devour the roots of the plant. The control of this insect is one of the acute problems before the sugar-cane planters of the Island. *Ligyrus bituberculatus* Beauv.

is of interest by reason of its attacking bananas in certain islands of the West Indies. The grubs tunnel the roots of the banana plant, and their injuries are apparently important.

Phytalus smithi Arrow is destructive to sugar cane in Mauritius where it has evidently been introduced from Barbados, its native home. On one occasion 1,372,000 beetles were captured by the natives, who placed small branches in the ground upon which the beetles climbed. *Holotricha vidua* is reported as the most destructive enemy of sugar cane in the Philippines and has necessitated the abandonment of certain fields. In India, Ceylon, Straits Settlements, Philippines, etc., *Oryctes rhinoceros* L., eats into the soft tissues of young palms, often killing the trees. *Diphucephala colaspidoides* injures fruit trees in Australia, especially cherry. The beetles come from the ground about "cherry time" and often in such countless multitudes as to strip a good sized tree in a very few minutes. *Apogonia destructor* R. Bos., as well as a related species, *A. ritsemæ* Sharp, are destructive pests of sugar cane in Java, injuring the roots of the plants like *Lachnosterna* sp. in Porto Rico. *Heteronychus morator* F., in the adult stage, attacks the young cane at the base in Java, often boring in the canes. *Xylotrupes gideon* L. also bores sugar cane in the Straits Settlements. *Anisoplia austriaca* Herbst., in Austria, Hungary and southern Russia, is one of the very troublesome Scarabids attacking cereals about blooming time, destroying the heads.

Cerambycidæ.

Xylotrechus quadripes Chevr. is a serious enemy of coffee in Southern India, Assam, Sylhet and Burmah, the larvæ boring the stems of the plant, especially those shaded. *Caloclytus annularis* Fabr. injures the bamboo, the larvæ destroying the plants by their borings. *Calamobius marginellus* Fabr. is a European species which injures wheat. The adult oviposits below the head which the resulting larva injures. *Batocera rubus* L., occurring in southern India and Ceylon, is one of the large beetles found throughout the plains, the larvæ being common under the bark of felled trees. The beetles penetrate the trunk of young coconut trees and there deposit eggs, the grubs eating to the top, thus destroying the leaves. The mango is also injured. This species has been recently introduced in Barbados, where its is doing considerable injury. An allied species, *Melanauster chinensis* Forst, is very injurious to fruit trees in Japan and China. *Apomecyna pertigera* Thoms. and *A. histrio* F., are common insects on cultivated crops in India, the former attacking cucurbits. *Acanthophorus serraticornis* Oliv. bores the mango in southern India, while *Plocoderus obesus* Gah. infests Sal wood, the larvæ making large cocoons apparently of

calcium carbonate. *Uracanthus acutus* Blackl. injures peaches, apricots and plum in Australia. *Steirastoma depressum* L., the cacao beetle, is the most serious pest of cacao in the West Indies, and the Guianas the larvæ living under the bark of the tree, and also boring the heart wood. *Diploschema rotundicolle* Serv. bores the orange in Brazil and is evidently a serious enemy of this plant. *Apriona rugicollis* Chevr. is a mulberry pest in Japan. The females oviposit on the branches, the larvæ boring into the wood. Three years are required for the life cycle.

Chrysomelidæ.

In this family are quite a number of injurious forms in different parts of the world. The group ranks close to the Curculionidæ in economic importance. *Lema flavipes* Suffr. is injurious to rice in Japan, in both the larva and adult stages. *Hispa callicantha* Bat. also injures rice in the same country, both adults and larvæ feeding on the foliage. *Crioceris merdigera* L., cogeneric with our asparagus beetles, is distributed over all Europe and is a decided pest of lillies in France, both the larvæ and adults feeding on the foliage, the former protected by their excrementitious covering. *Pachnephorus bretinghami* Jac. and *P. impressus* Ros., replace, in India, *Myochrous* in America. They are quite injurious to the young shoots of sugar cane and to cereals. *Chrysochrous chinensis* Baly injures the sweet potato in Formosa. *Galerucella tenella* L. is common over Europe and attacks the strawberry, though not as yet important apparently. *Galeruca semipullata* in Australia, infests wild and cultivated figs, the dirty yellow larvæ feeding on the leaves. *Chætocnema concinna* Marsh, of Europe, is a pest of hops, the beetles defoliating the plants, attacking also the shoots. *Chætocnema basilis* Baly is a rice flea beetle in India, and other species injure various crops. *Haltica ampelophaga* Leesb., the grape flea beetle of Europe is one of their more important vineyard pests. *H. indigacea* Illig. in Cape Colony, is injurious to buds and foliage of fruit trees in spring.

Hispa ænescens By. is a very important rice pest in India. *H. modesta* We. has been reared from sugar cane in the same country. *Leptispa pygmæa* Baly attacks rice in Malabar. *Brontispa froggatti* Sharp, the palm leaf Hispa, injures the foliage of its host plants in New Britian and Solomon Islands generally.

Scelodnota strigicollis Mots. is a pest of grapes in India. Its habits are thought to be like those of our *Fidia viticida*. *Odontionopa sericea* Gyll., in South Africa, injures buds and leaves of fruit trees in the spring.

Aulacophora hilaris Bvd. is a serious pest of cucurbits in Australia, where it is known as the banded pumpkin beetle. This, or

a related species (*olivieri*) is considered the worst leaf-eating pest with which gardners have to deal, attacking also the fruit of the cherry. Another species, *A. foveicollis* Kuest. is a cucurbit pest of importance in Formosa, India, etc. and, *A. exacavata* Baly is present along with the former, and has about the same habits.

RHYNCHOPHORA.

Among the Rhynchophora are to be listed very many of the worst insect pests of the world, and the number of species to be noted in the present connection is relatively large.

Anthribidæ.

The apple beetle of Australia, *Doticus pestilens* Oliff, falls here. It is supposed that eggs are laid in the young fruit. The grubs live in the apples, which, after about a month, shrivel and dry and remain hanging on the trees. The stages of the insect are passed in the fruit, the beetles coming out in the spring, ovipositing in the young fruit.

Curculionidæ.

Several species of *Otiorrhynchus* are to be mentioned. *O. sulcatus* F., native to northern and middle Europe, is now present in New Zealand, Australia and South Africa. It injures both the roots and foliage of strawberry and raspberry plants. *O. corruptor* Host occurs in Italy and attacks the foliage of the grape and almond. *O. singülaris* L. is a pest of raspberries in Europe. The beetles eat the fruit buds, blossoms and foliage and gnaw the bark of tender shoots. The grubs feed on the roots of the raspberry and various other plants. *O. lævigatus* Fabr., occurring over middle Europe, is injurious to buds and shoots of plum, and *O. ligustici* L. in central and southern Europe, attacks grape, peach and hops, etc., injuring the leaf and fruit buds, as well as the shoots. Several other injurious forms in the genus ought to be mentioned. *Pachneus litus* and *P. azurescens* are serious orange pests in Cuba, the larvæ feeding on the roots of the plants. *Phyllobius maculicornis* Germ., *P. oblongus* L., *P. pyri* L., occurring over Europe, attack various fruit trees, as well as *Fagus*, *Quercus*, etc. *Barypithes araneiformis* Schrank, present in central Europe, injures strawberry by eating holes in the green and ripe fruit. *Sitona lineata L.*, distributed over Europe, and *S. sulcifrons* Thunb, attack the shoots of peas as they are pushing through the ground, and later, the foliage. *Cleonus luigionii* Motsch. present in central and southern Italy, is quite injurious to the beet, the larvæ boring the roots. *Liparus coronatus* Geoze, is destructive to carrots in a similar way. *Phytonomus variabilis* Herbst. attacks species of

Medicago, the larvæ feeding on the foliage. The species is present over Europe. *Euscepes batatæ* Waterhouse, the so-called "scarabee" or "Jacobs" of the West Indies, is a very important pest of the sweet potato, the tubers of which the larvæ tunnel. It is also present in Hawaii. *Cryptorhynchus gravis* Fabr. is the mango weevil of eastern Bengal and Assam, while *C. mangiferæ* Fabr., is the common species in South India and Ceylon. Mango weevils are, without doubt, the most serious pests of the mango in oriental countries. The latter species is said now to inhabit all the mango regions bordering the Indian Ocean, and adjacent islands, and occurs through the East Indies, the Philippines and other groups of South Pacific Islands. It is present in South Africa, Madagascar and other places. *Ceutorrhynchus pleurostigma* Marsh, ranging over Europe, is destructive to cruciferous plants, as is also *C. assimilis* Payk, of similar habits. Another species, *C. napi* Gyll., is also injurious to cabbage. Two species of *Baris* also attack cabbage, namely, *B. cuprirostris* F. and *B. chlorizans* Germ. *Rhynchophorus ferrugineus* F. is the red palm weevil of India and Ceylon, infesting the toddy and coconut palms. The eggs are placed at a wound or cut in the soft tissues at base of leaf sheath, the larvæ tunnelling through the tissues in all directions, making a cocoon of twisted fibres. *R. palmarum* L. is the palm weevil of Brazil, Cayenne, Surinam, the West Indies, and probably occurs on tropical coast of South America generally. The palm weevil is recorded as also attacking sugar cane in Trinidad. *R. cruentatus* Fab. occurs in Florida.

Sphenophorus obscurus Boisd. is the destructive sugar-cane borer in Tahiti, Hawaii, New Guinea, Fiji, etc., It is widely spread but is not on the mainland of the United States. It also attacks the coconut. The female enters between a leaf sheath and the stem. A small cavity is cut with the mandibles, in which an egg is placed. The resulting grub tunnels upward in the cane, making occasional apertures to the exterior. *S. sericeus* Oliv. is a well known enemy of sugar cane in the West Indies, where it is designated the weevil borer. *S. sordidus* Germar injures the banana in the West Indies and is especially complained of in Fiji. The young suckers are attacked and quickly killed by the larvæ boring in the base of the plants. It is said to occur from the South Pacific Ocean to the Islands of the Indian Archipelago.

Balaninus nucum L., the nut weevil of Europe, is commonly injurious to the filbert, cob and wild hazelnut. Other species present in Europe are of more or less importance, as *B. cerasorum* Hbst., attacking sour and sweet cherries, and *B. elephas* Gyll., attacking chestnuts.

On of the weevils of Europe which has not yet reached the United States, and which is without doubt a first class pest of the apple is

Anthonomus pomorum L. The female deposits eggs in unopened flower buds and blossoms of the apple. Its injuries were recorded as early as 1801, and there is now a considerable European literature on the species. Cold, damp weather, retarding the opening of apple blossoms, is said to be quite favorable to it. The symptoms of injury are the scorched appearance of the blossoms, and their failure to open normally.

A. rubi Herbst., in Europe, injures the raspberry in about the same manner as the foregoing. The weevils of the new generation puncture the shoots and feed on the foliage. *A. rectirostris* L. attacks stone fruits in Europe, especially cherries. The grub infest the pits or seeds like our *Coccotorus prunicida* apparently. The cotton square weevil of Peru, species of *Anthonomus*, probably *vestitus* Boh. injures cotton in a way similar to *A. grandis*. *A. varipes* DuVal injures the egg plant in Cuba, the beetles feeding on the tender buds. *Magdalis* is well represented in Europe by species occurring on useful plants. *M. armigera* Geoff. infests branches of plum trees. *M. barbicornis* Latr., the branches of apple, quince. etc. *M. cerasi* L., cherry and plum; *M. duplicata* Germ., pear; *M. ruficornis* L., various orchard trees, and *M. violacea* L., the pear. *Apion apricans* Hbst., of Europe, attacks red and purple clover. Eggs are placed in the blossom heads, the larvæ eating the unripe seeds, reducing seed production. There are several broods each year. *Rhynchites cæruleus* DeGeer oviposits in tender shoots of apple, and then cuts off the twig just below the point of insertion of the egg. Considerable injury is thus done to young growing trees. The insect occurs over Europe. *R. ruber* Fairm, occurring in Greece, Corsica, Crete, etc., is a very local species, but which is quite a pest of the olive. The female oviposits in the fruit in which the grubs feed much like our *Conotrachelus nenuphar*. Other species of *Rhynchites* are of more or less prominence in Europe to one plant or another, as *R. bacchus* L., *cupreus* L., *interpunctatus* Steph., etc. *Byctiscus betulæ* L., distributed over Europe, Asia, Siberia, etc., injures numerous plants in its range, and is especially likely to attack the grape. *Diaprepes abbreviatus* is present generally throughout the West Indies, where it is destructive to sugar cane, especially in parts of Barbados. *Rhinaria perdix* Pascoe is a serious enemy of strawberry in Victoria and Tasmania, and to a less extent, raspberries. Both adults and larvæ are destructive, though the larvæ more so as they feed on the central "bud" of head of the plant, thus often killing the plants outright. *Rhadinosomus lacordairei* is said to be the worst insect enemy of strawberries in Tasmania, and occurs in all of the Australian States, and perhaps in New Zealand. Another Australian pest is *Leptops hopei* Fahrs., which is said to be one of the most troublesome insects of Victoria, attacking especially apples and pears. Eggs

are laid in batches on the leaves, and the grubs crawl down in the soil and feed on the roots in which they cut galleries and furrows, often largely devouring them. *Metatyges turritus* Pasc. is quite injurous to figs in Natal and the east coast generally. Eggs are laid in the fruit in which the grub feeds. The species is two-brooded. *Echinocnemus squameus* Billb. is a rice pest in Formosa, the larvæ feeding on the roots. A species of *Phylaitis* bores the stems of cotton in South India and Behar, fron the effect of which the plants become weakened, break off and die. *Orthorrhinus klugi* Sch. is injurious to grape in Australia, the larvæ hollowing out the canes. Another species of the same genus, *O. cylindrirostris* Fabr., is a pest of the orange. The eggs are laid in the bark of the tree, a foot or so from the ground, the larvæ boring into the wood in all directions. The tomato weevil of Victoria, *Desiantha nociva* Lea, has attracted some attention on account of its injuries to tomato. Certain species of *Belus* are regarded in Victoria as serious enemies of the apricot. Adults bore holes in the branches in which the eggs are placed, the grubs tunnelling the branch, thus killing the trees. The species mentioned are *B. bidentatus*, *B. suturalis*, *B. irroratus*, *B. centralis* and *Belus sp.*

HYMENOPTERA.

Tenthredinidæ.

Allantus cinctus L., distributed over Europe, infests normally the leaves of the rose, wild and cultivated, and is known to attack the raspberry. The prepupal larvæ hollow out the canes, where also they pass the winter, transforming in the spring. *Athalia spinarum* Fabr., occurring in Europe, Algeria, etc., is injurious to the turnip, beet and cruciferous plants, destroying the foliage. *A. proximata* Klug, in India, feeds on cruciferous plants generally and is one of the commonest species of the plains.

Two species of *Hoplocampa* are troublesome pests. *H. testudinea* Klug occurs over central Europe, and is quite injurious to apple in portions of England. The females oviposit in the apple blossoms, the larvæ boring into the young fruit, which later fall. A related, and perhaps identical species, is already established in Washington State, and in British Columbia. *H. fulvicornis* Panz. also ranging over central Europe, attacks the plum after the same manner, and is a pest of importance in England.

Pteronidea leucotrochus Htg. is injurious to gooseberry, the larvæ eating the foliage like *N. ribesii* and is spread over central and northern Europe. *Priophorus padi* L., the plum saw-fly, ranges over central and northern Europe, the larvæ feeding on the foliage, also attacking pear, rose, hawthorn, etc. *Diprion pini* L., distrib-

uted over central and northern Europe, defoliates the pine, as its name indicates, to which at times, it is quite destructive. *Arge rosæ* L. is a rose pest widely spread over Europe, and occurs in Siberia and Asia Minor.

Janus compressus Fabr., of central and southern Europe, deposits its eggs in the buds of the pear, which the larvæ hollow out, and later eat their way into the twig, tunnelling along the pith. *Pamphilius flaviventris* Retz is distributed over western Europe. It is known in England as the social pear saw-fly. Eggs are placed in groups of from 30 to 60 on under-surface of pear leaves. The young larvæ at once commence to form a web, which is added to as they grow, sometimes reaching a length of a foot. The larvæ also feed upon plum, cherry, white thorn and other rosaceous plants.

The author wishes to acknowledge the assistance of his colleagues, Messrs. Schwarz, Dyar, Busck, Caudell, Heidemann, Knab, Rohwer and others in connection with questions of nomenclature in the orders in which they are respectively specialists.

Commenting on Professor Quaintance's address, Mr. Marlatt said that he had been much interested in the presentation made, and that the subject was most timely in view of the recent enactment of the plant quarantine law which now furnishes, for the first time in the history of the United States, a means of excluding foreign insect pests. It is therefore of especial importance just now to make available a publication which will give descriptions and, so far as possible, illustrations of all known important foreign insect pests, for the guidance of state inspectors and others engaged in plant quarantine and inspection work. He said that he believed Dr. Howard had in view the preparation of a comprehensive bulletin covering this general subject, and that it was to be prepared with the aid of the many experts which Dr. Howard had as his assistants in the Bureau of Entomology. Such a publication, prepared with the aid of these experts and edited by Dr. Howard, should have a comprehensiveness and value which would make it of great usefulness.

The inspection of plant material imported by the Department and other imported plant stock coming to the District of Columbia, largely under the expert management of Mr. Sasscer, has shown that much of such imported stock is infested, and the comparison

of the findings made from the local inspection referred to with that of state inspectors shows the great value of the wider acquaintance which the Bureau inspectors have with foreign insect pests. Necessarily most state inspectors are little acquainted with foreign pests, and have expert knowledge only of the common insect and fungous pests of this country. A publication, therefore, for which Professor Quaintance's address may furnish the basis, is very much needed.

The classification of foreign injurious insects would perhaps be more useful to the inspectors and quarantine officers if it were based on countries and food plants. The inspector, then, knowing the country of origin and the character of the plants, could determine at once the known injurious insects which he would have to be on the watch for. A systematic classification of such insects could also be included, following theplan adopted by Professor Quaintance.

Mr. Marlatt added that a publication of this kind must necessarily be based on known injurious insects. It should not be overlooked, however, that the injuriousness of an insect in a foreign country (and this, was alluded to by Professor Quaintance) is not necessarily a measure of its possible economic importance if established elsewhere. The San Jose scale, for example, as found by Mr. Marlatt in northeastern China, was an insect of little importance on native plants and fruits, presenting a very scattering and insignificant infestation. The wide horticultural exploration conducted later by Mr. F. N. Meyer in northern China and Manchuria resulted in his importing quantities of fruit twigs and trees for the Department of Agriculture. Much of this material was infested with the San Jose scale, but most scatteringly and giving no indication whatever of the tremendous power of damage which this scale insect has developed in this country. Many other illustrations of the same sort will occur to most entomologists, and they simply emphasize the need of not only looking out for the known injurious species, but making the most careful inspection to detect any new form, however unimportant it may appear on the imported plants. This is particularly true of all plant stock imported from countries which have not been in close commercial relationship with this country and Europe. Practically all the scale insects,

in addition to the San Jose scale, and other pests found on the plants just referred to as imported from northern China and Manchuria proved to be new, and therefore with unknown potentialities for injury. This condition is also likely to be true of South American, African, and most Asiatic countries. Inspectors should therefore be especially vigilant in the examination of stock from such countries.

Appreciating the special danger from such countries the Federal Horticultural Board, in the revision of its regulations, has very greatly restricted the importation of plants from all countries which cannot or do not have an adequate system of plant inspection and certification. This practically limits free importation to European countries and European colonies which have well established entomological and plant pathological bureaus. From Asiatic and other countries where inspection is not possible the importation of plants is limited to small amounts, and these are to be held at the port of entry until thoroughly inspected and passed by federal inspectors, the provision being intended merely to furnish a means of entry of new and valuable fruits or ornamental plants.

Mr. Marlatt extended his hearty congratulations to Professor Quaintance for the comprehensive and excellent manner in which he had covered in his address the field of foreign injurious insects.

Dr. Howard stated that he had listened to Professor Quaintance's address with considerable interest and hoped the paper would be published in full. He made a few remarks on the work of insects in other countries and spoke of discussions which he heard at the International Congress of Zoölogy in reference to the quarantine law recently passed in this country. He mentioned a talk by Mr. Rogers of the Board of Agriculture and Fisheries of Great Britain, who seemed to be of the opinion that the United States should accept the observations of experts in foreign countries before taking any action along quarantine measures, but our distinguished colleague, Dr. S. A. Forbes, soon showed the fallacy of his comments.

After remarks by President Busck on the capable manner in which Professor Quaintance conducted the meetings as President during the year, Mr. Schwarz moved that the Society extend to

Professor Quaintance a vote of thanks for the efficient manner in which he managed the affairs of the society and for his timely and most interesting address. Carried.

Mr. Gahan presented the following paper:

SOME NOTES ON THE PALPI OF APHIDIINÆ.

By A. B. Gahan, *Maryland Agricultural Experiment Station.*

In a previous communication before this Society, the writer called attention to certain variations in the number of antennal segments in various species of Aphidiinæ. Among other species studied with regard to this variation was *Diaeretus rapæ* Curt., the common parasite of *Aphis brassicæ*.

Recent study of the same species has brought to light another and more surprising variation, this time in the number of segments in the maxillary palpi. While apparently the palpi are more frequently four-segmented than otherwise, in a series of one hundred and fifty or more specimens there appear to be almost as many in which they are distinctly three-segmented. Not only is this true but several specimens were observed in which one palpus was plainly four-segmented while the other had but three complete segments.

In cases in which the number of segments differs in the two palpi of the same individual, it is apparent that the difference is due to an imperfect separation of the third and fourth joints in one palpus. The point at which the division should have occurred is usually indicated by a more or less distinct notch on one or both sides of the segment. In specimens having both palpi three-segmented, usually no such notch is present but the third segment is generally, though not always, somewhat more elongate than is the case in the four-segmented palpi.

That this is really a variation within the species seems certain, since a small series of specimens, all the progeny of a single female, shows individuals having three-jointed palpi as well as others in which the palpi are four-jointed. That it is not merely an accidental variation is proven by the fact that in several large series of specimens reared from the cabbage aphis on widely different dates the same variability occurs.

Both sexes vary alike and in about the same proportion, so that the differences are in no sense sexual.

In view of the fact that some importance has been attached by Haliday, Marshall and others to the number of palpal segments, in the classification of the Aphidiinæ, it is of some interest to know whether the same variability occurs in other species and genera of

the group. With a view to the determination of this point, series of specimens (in each case numbering over ten and in some cases one hundred) representing the following species and genera have been studied: *Ephedrus incompletus; E. californicus; Praon coloradensis; P. simulans; P. occidentalis; Aphidius nigripes; A. polygonaphis; A. pinaphidis; A. ribis; A. phorodontis;* and *Lysiphlebus testaceipes*. In not a single one of these species was there found a similar variation. On the contrary the maxillary palpi of species of *Ephedrus, Praon* and *Aphidius* so far as indicated by the species studied seem to be constantly four-segmented, while in *Lysiphlebus* there are never more than three segments. The relative length of the segments does often vary slightly and in one or two instances specimens were found in which the segmentation appeared to be incomplete but in no instance was there found so remarkable a condition as in *Diaeretus rapæ.*

In discussing this paper Mr. Rohwer remarked on the variation in the number of joints of the palpi of sawflies and stated that within the genus *Diprion* he had found both symmetrical and asymmetrical variation of five to six joints of the maxillary palpi.

Under the heading of short notes the following communications were presented.

——Mr. Rohwer called attention to the paper by A. Cosens entitled "A Contribution to the Morphology and Biology of Insect Galls," which appeared in the Transactions of the Canadian Institute, volume IX, 1912, pp. 297–387, pls. 1–13. This publication deals with galls primarily from the botanical standpoint, but a number of very interesting observations were made which should become available to all entomologists interested in the study of galls.

In Mr. Cosens' work he has discovered a number of new species and in the genus *Pontania* has been able to distinguish striking morphological differences between the galls of closely allied species. Mr. Cosens proves that the gall is produced by an enzyme, and also that the gall can be produced if the stimulus is not applied to the cambium layer. He also proves that certain inquilines in "Cynipid galls also possess the gall-producing power but to a less extent than the real producer;" and the "gall producing stimulus renders the protoplasm of the host more active and awakens in it

dormant characteristics but apparently does not endow it with the power of producing entirely new structures." Mr. Cosens adds that the awakening of dormant characteristics "has been demonstrated in the case of glands, trichomes and aeriferous tissue;" that "the shape of galls is controlled partly at least by the direction of the stimulus and the location of the egg of the producer. In galls such as those of the Lepidopterous types, where the larva burrows into the tissue after leaving the egg, this feature has no effect." It was found that "the relation of the various zones in the Cynipid galls is influenced in some cases by the early differentiation of the cambium layer." Besides these interesting conclusions the paper contains much valuable matter about the ecology of certain species of gall producing insects, and deserves serious consideration from entomologists as well as botanists. It is hoped that Mr. Cosens will continue this valuable work so that it may eventually be possible to separate all the species of galls by their structure alone.

——Dr. Howard exhibited some photographs made by Mr. Hodge which were shown at the Cleveland meeting of the American Association of Economic Entomologists. The pictures were of a device for catching house and stable flies. Mr. Hodge has devoted much of his time and energy to making a trap to catch these annoying insects. Dr. Howard described the manner in which these insects were captured and stated that in one trap Mr. Hodge had caught 37½ quarts within a short period. He also spoke of another trap which was placed near a cow in which were caught 4 quarts, 90 per cent of which were *Stomoxys calcitrans*. Mr. Hodge stated at that meeting that this trap was placed there for only one week and would have doubtless caught more but for the fact that the trap was full.

Dr. Howard then spoke of an additional orifice near the top which Mr. Hodge was placing on his latest traps which will permit a larger catch.

Mr. A. C. Morgan then read the following paper:

AN ENEMY OF THE CIGARETTE BEETLE.

By A. C. Morgan, *Bureau of Entomology.*

In April, 1912, Mr. W. D. Hunter and the writer, while inspecting a cigar factory at Key West, Florida, to determine the extent of loss due to the cigarette beetle, *Lasioderma serricorne* Fabr., had their attention called to another beetle which was said to do damage to tobacco. The latter insect is known locally as the "Bicho grande," because the adult is much larger than that of *Lasioderma serricorne*. During the examination of this factory several bright red and very active larvæ were found in bundles and boxes of old cigars. Later the adults of this larva, a species of the family Cleridæ were found. Experiments very quickly demonstrated that these red larvæ were predaceous upon the larvæ and pupæ of *Lasioderma serricorne*, and later Mr. G. A. Runner found that the adult Clerid was also predaceous upon larvæ, pupæ and adults of the cigarette beetle.

Adults were sent to Mr. E. A. Schwarz who determined the species as *Thaneroclerus girodi* Chevr. and stated that this was the first record for the United States. In Bull. Ent. Soc. France for 1880, p. xxxi, occurs the only reference to this insect in literature. Here Chevrolat described this species and added a note of which the following is a translation: "This insect, peculiar to Cuba, has been found by Girod in cases of injured tobacco (injured presumably by the cigarette beetle) and was given to me by M. Ant. Grouvelle. It is likely to be predaceous upon the larvæ and perfect insects of the genus *Catorama*."

It is interesting to be able to furnish the proof that this Clerid is predaceous upon *Catorama*, of which genus one of the old species is now known under the name of *Lasioderma serricorne*.

Thaneroclerus undoubtedly occurs also at Tampa, Florida, for during October, 1912, Mr. G. A. Runner and the writer took a few specimens of a bright red larva apparently identical specifically with the ones taken at Key West.

In discussing this paper Mr. Schwarz mentioned the fact that another enemy of dry Cuban tobacco had recently been found in the United States. This species is *Catorama tabaci* Guérin which has frequently been reported as an importation from Cuba in various places in Europe. It was found in Cuban tobacco by a dealer in Philadelphia. More recently it was received at the Bureau of Entomology from the Lopez factory in Key West, Florida. In

this instance a large number of specimens in all stages were received. The species is larger than any of the native species of *Catorama*, and it is strange that its presence in the United States has not been located hitherto. On account of its large size it is likely to cause much more damage to cigars than the cigarette beetle.

——W. D. Hunter exhibited a sketch of a very successful device for breeding *Simulium* perfected by Mr. A. W. J. Pomeroy during his connection with the Illinois State Laboratory of Natural History. The device provides the two essential requisites in breeding *Simulium* larvæ, that is food and well ærated water. It consists essentially of two wooden tanks through which water is allowed to pass. The first of these tanks is partly filled with algæ. The water passing through this tank becomes impregnated with the detritus of the algæ. It then passes through a pipe to a second tank in which the actual breeding takes place. This second tank is provided with lantern globes lying on the bottom on their sides but slightly tilted upward in the direction from which the water flows. When the apparatus is in operation the water passes into the second tank forming minute waterfalls when it flows into the lantern globes. The flow can be regulated so that the discharge through the chimneys is as shallow as a quarter of an inch. It is in this stream that the larvæ or eggs are placed. In actual practice it was found that in this situation they were perfectly at home, not showing any tendency to leave the chimneys.

In the original apparatus the tanks were about 5 feet long. This gave sufficient space in the lower tank for about twenty lantern globes which would allow the breeding of as many isolated lots of *Simulium* larvæ in a space considerably smaller than the top of an ordinary table.

——Mr. McAtee presented the following note: While exploring Lake Pomme de Terre, near Hamburg, Louisiana, last September, my old negro guide inquired whether I would like to see how fish-bait was obtained in that locality. As I expressed an interest in the procedure he pulled up a long leaf stem of *Nelumbo lutea*. All of the stem except a foot or two nearest the leaf was thickly studded with larvæ and cocoons of *Donacia*. The part of the stem bearing them was probably buried in the almost liquid bottom of the lake, the upper layers of which are composed of coarse vegetable detritus.

It was noticed that the feeding larvæ had the head and forepart of the body buried in the cavity they had eaten out of the stem, but that the posterior part of the body was standing out free in the water. This would suggest that, at will, they are able easily to pierce the wall of the stem with their modified spiracles and that perhaps the larva has some other means of securing a supply of oxygen. It would be very interesting to know the composition of the gas in the interior of these stems, as in all probability it is not the same as that of atmospheric air. The adult *Donacia* collected at the time these observations were made has been identified as *D. cincticornis*.

The two following papers were read by title and accepted for publication.

OBSERVATIONS ON THE EGG PARASITES OF DATANA INTEGERRIMA WALK.

By H. M. Russell, *Bureau of Entomology*.

The writer collected the data contained in this paper while stationed at Orlando, Florida, during the years 1907 and 1908. The summer of 1907 seemed to have been favorable to *Datana integerrima* Walk., the black walnut caterpillar, as the colonies of larvæ of this insect were extremely abundant on the pecan and destroyed the foliage extensively. This abundance apparently resulted in a great increase of the egg parasites of this insect as the eggs of the last generation in the fall of 1907 were largely parasitized by minute Hymenoptera. This probably accounts for the smallness of first brood in 1908. At the time of the fall abundance the writer collected a number of egg-masses of *Datana integerrima* and from these reared four species of parasites. The writer is indebted to Mr. J. C. Crawford, of the National Museum, for the determination of three species and to Mr. A. A. Girault for the determination of *Trichogramma minutum* Riley. Of these, *Trichogramma minutum* Riley belongs to the Trichogrammidæ and *Baryscapus* sp. belongs to the family Eulophidæ, subfamily Tetrastichinæ, *Telenomus sphingis* Ashm. belongs to the family Scelionidæ and the fourth, *Ooencyrtus* sp. belongs to the family Encrytidæ, tribe *Mirini*.

The eggs of the host were collected from August 23 until about the 10th of October, from the various pecan grooves around the station, and each mass was placed in a glass vial. Daily observations were made and the parasites removed and recorded in the notes. These records have been placed in tables, as rendering the data more quickly and easily available to the reader.

In table I the total number of eggs parasitized by the 4 species of parasites is given.

Thus, out of a total of 10,926 eggs of *Datana integerrima* contain tained in 22 egg-masses only 3924 larvæ emerged, or 36.+ per cent, while parasites emerged from 6365 eggs, or 58.+ per cent, and 637 eggs, or 5.+ per cent, failed to disclose either larvæ or parasites. Among these many contained dead parasites, as revealed by dissection.

TABLE I.—*Record of parasitism of eggs of Datana integerrima, September and October, 1907.*

Date.	Number of eggs.	Larvæ hatched.	Parasites hatched.	Eggs unhatched.
September 19	225	0	213	12
October 8	332	0	325	7
	365	0	354	11
	845	839	0	6
	258	256	0	2
	901	0	834	67
	807	0	771	36
	272	260	0	12
	1051	1012	0	39
October 9	204	0	188	16
	67	0	63	4
	138	0	136	2
October 31	1035	0	1021	14
	1054	0	1013	41
	26	0	21	5
	228	195	1	32
November 1	168	90	6	72
	149	126	20	3
	949	0	901	48
	376	178	132	66
	736	432	233	71
	740	536	133	71
Total	10926	3924	6365	637

In table II is given the record of emergence of each species of parasite from 16 egg-masses of the host. In this table each species is designated by letter, A is *Telenomus sphingis* Ashm.; B *Trichogramma minatum* Riley; C *Ooencyrtus* sp., and D an undescribed species of the genus *Baryscapus*. The number preceding the letter indicates the number of individuals which appeared.

In table II it will be observed that many of the egg-masses were parasitized by two or three of these species and in one case speci-

mens of all 4 species were reared from the same egg-mass. The writer has placed a summary of the number of each species reared from 19 egg-masses in table III.

The totals for this table, omitting the partial records in Nos. 7, 9, 13, and 16, show that out of 7187 eggs, 2438, or 33.9 per cent, hatched as larvæ; 2073, or 28.8+ per cent, remained unhatched; and 2676, or 37.2 per cent, gave out parasites. Of these parasites *Telenomus sphingis* emerged to the number of 1515, or 65.6+ per cent; *Trichogramma minutum* emerged to the number of 49, or 2.1+ per cent; *Ooencyrtus* sp. emerged to the number of 686, or 29.7+ per cent; and *Baryscapus* sp. emerged to the number of 59, or 2.1+ per cent. The percentage of parasitism should run considerably higher than this, as many of the unhatched eggs were found to contain dead parasites.

It was observed in the experiments with these egg-parasites that *Trichogramma minutum* would emerge from the eggs at the same time that the larvæ of the host were hatching, indicating a short period of development for this species.

Telenomus sphingis and *Ooencyrtus* sp. were observed to emerge from the host eggs about five days after the larvæ had emerged, and frequently both species would emerge from an egg-mass at the same time.

The fourth species, *Baryscapus* sp., was observed to emerge from three to eleven days after *T. sphingis* and *Ooencyrtus* sp. had emerged.

Many of the egg-masses collected were almost totally parasitized, as from nearly every egg a parasite emerged. In others it was observed that although the eggs were extensively parasitized, many of the parasites either died in the eggs without cutting a hole or after cutting an emergence hole could not free themselves and died while partially out of the host egg. In one case observed, from a mass of 968 eggs only 176 parasites emerged, while 694, after partially eating their way out, died in the shells. This was probably owing to a lack of moisture, due to the artificial method of rearing in vials.

Telenomus sphingis was by far the most abundant and important egg-parasite of *Datana integerrima* of the four species under observation. This is a minute, black-bodied insect with yellowish legs and hyaline wings. The process of oviposition of this species was observed and will illustrate in a general way the process for the others.

The female crawls rapidly over the eggs with the antennæ in constant motion, examining them until she finds one that seems suitable. She then halts and explores the surface of this egg with her antennæ, at the same time turning around repeatedly until the entire surface of the egg beneath her has been examined. If satisfied, she takes a

TABLE II.—*Record of emergence of egg-parasites of Datana integerrima.*

Number of eggs in mass	Dates parasites emerged with number and species, October–November, 1907.															
	Oct. 2	Oct. 3	Oct. 4	Oct. 5	Oct. 7	Oct. 8	Oct. 9	Oct. 10	Oct. 11	Oct. 12	Oct. 14	Oct. 15	Oct. 16	Oct. 30	Oct. 31	Nov. 1
167								66-A	1-A						20-C	
889	5-B	9-B	12-B	8-B	11-B	65-A	61-A	72-A	4-A	7-C	8-C					
690	3-A	9-C	12-A 11-C		15-A					1-C						
848			25-A		37-A	1-A 2-C	2-A 2-C						1-C			
387					18-A		1-A	35-A	15-A	6-A 4-C						
968		127-A 2-D	58-A 4-D	20-A	194-A	8-A									185-A	
1024					45-B											
809				13-C	20-A 23-C	87-A 14-C	58-A 33-C	1-A 23-C	3-C		25-C 3-D	3-D	9-D		221-A 4-B	
186						56-A	37-C									
672						3-C	4-C	4 C	2-A 1-C 1-D							
144															26-A	
244								10-A	26-A	1-A						
868														11-A 465-C 13-D		5-A 3-C 25-D
28															3-A 6-B 7-C	
27															13-A	3-D

position on the side of the egg, and partly upon the egg next to it, and suddenly dropping the tip of the abdomen, forces the ovipositor into it. During the egg-laying process she keeps up a slight pulsating movement of the body and vibrating motion of her antennæ, while some of her legs also are in motion. After a short time she withdraws the ovipositor and with it apparently scratches the surface of the shell. She then moves away and cleans herself; first the antennæ, by rapidly brushing the forelegs over them, then the fore legs and middle legs, by passing them through her mouth. She cleans her wings and abdomen with the hind legs. After this process is completed the female begins to examine the eggs again for a suitable one in which to oviposit and in doing this she may select the first or reject several. The time consumed in the deposition of an egg was observed to vary from $2\frac{1}{2}$ minutes to $8\frac{2}{3}$ minutes and for six eggs averaged $5\frac{2}{3}$ minutes, while the interval between oviposition was observed to vary from 15 seconds to 12 minutes. As this insect develops in the host egg the latter changes from a pearly white to a dull black. This same result is produced by each of the other three parasitic species, and a few days after the eggs are parasitized these may be easily separated from the healthy eggs. When the parasite is mature, it chips away the eggshell of its host, making a hole nearly one-half the diameter of the egg, and through this it emerges.

Trichogramma minutum is a very tiny, yellow creature with red eyes and is not half so large as *Telenomus sphingis*. The parasitism by this insect was not very extensive in the number of eggs destroyed, possibly owing to the fact that generally several eggs are laid in each egg of the host, and also to the fact that this parasite has so many other hosts.[1] The writer has reared it from the eggs of *Calpodes ethlius* Cram. in Florida, and in southern California from the eggs of *Peridroma magaritosa* Haw., *Phlyctænia ferrugalis* Huebn., *Dione vanillæ* L., and *Tortrix* sp. This insect develops rapidly and when ready to emerge from eggs of *Datana integerrima* one of the inclosed parasites cuts a small circular hole not over one-fourth the diameter of the egg. This may be on the top or down on the sides, and in a few cases two holes may be found in one egg. As soon as the hole is large enough the insect works its head through, the forelegs follow, and in a short time it pulls itself free. Immediately another of the parasites appears at the hole and works its way out and so on until all have emerged. In one of the two cases in which the entire process was observed, 4 parasites emerged from the single egg, and in the other 5 emerged.

Next to *Telenomus sphingis* the most important of the egg-para-

[1] Girault records 45 species belonging to 4 orders as hosts of this insect. Bul. Wisc. Soc. Nat. Hist., vol. IX, No. 4, p. 161, October, 1911.

sites of *Datana integerrima* is a species of *Ooencyrtus*, which in these experiments was about half as numerous as *T. sphingis*. In many cases it was found infesting eggs in the same mass as *Telenomus sphingis*, but in some it occurred alone. This insect is about the size of T. *sphingis* and to the unaided eye has the same general appearance, but it may be easily distinguished by its white-and-black legs. This species aids materially in reducing the numbers of its host, as shown by the fact that out of about 8000 host eggs, 720 parasites of this species were reared. According to the views of the writer what is doubtless the same insect has also been reared by him from the eggs of *Schizura concinna* S. & A., at Orlando, Fla.

Baryscapus sp. is probably a hyperparasite of *Telenomus sphingis* and *Ooencyrtus* sp., as it occurs in the same egg-masses with them to a limited extent and is always days behind the others in emerging. It is longer than the other species and one sex is black, while the other is dark brown, while both sexes have red eyes. Only 50 specimens of this insect were reared from nearly 8,000 eggs of *Datana integerrima*, showing that it is not very abundant as compared with the other parasites reared.

TABLE III.—*Summary of egg-parasitism of Datana integerrima, September to November, 1907.*

Expt. number.	Number of eggs.	Number of larvæ.	Number of unhatched eggs.	*Telenomus sphingis.*	*Trichogramma minutum.*	*Ooencyrtus* sp.	*Baryscapus* sp.
1	168	2	78	67	0	20	0
2	889	300	301	202	45	19	0
3	690	593	31	30	0	21	0
4	848	393	320	65	0	5	0
5	387	156	147	75	0	4	0
6	968	9	265	592	0	0	6
7	1024	697	55	?	45	others escaped.	
8	809	41	231	390	4	134	12
9	186	?	?	56	0	37	0
10	672	522	132	2	0	15	1
11	144	0	64	26	0	0	1
12	244	0	199	37	0	0	0
13	1191	?	?	?	?	?	?
14	473	0	40				
15	868	422	255	16	0	468	36
16	28	?	?	3	6	7	0
17	27	0	10	13	0	0	3
Total	9615	3116	2258	1574	100	720	59

TABLE IV.—*Egg-parasitism of Datana integerrima for the spring brood of 1908.*

Mass Number.	Number of eggs in mass.	Number of larvæ hatched.	Number of parasites hatched.	Number of eggs not hatching.
1	393	304	4	85
2	683	402	109	172
3	789	0	752	37
4	779	502	186	101
Total...	2644	1208	1051	395

In the spring of 1908 the pecan trees were very closely examined for eggs of the host of these 4 species of parasites, but very few egg-masses or larval colonies of the first brood could be found, even in the groves where the summer before they had been abundant. Only 4 egg-masses were collected and they furnished the data on the egg parasitism of the spring brood as shown in table IV.

Calculating the percentages from this table, 45 per cent of the eggs hatched, as larvæ, 39.+ per cent were parasitized, and 14 per cent failed to hatch. As these were the eggs of the first brood in the spring, the number of parasites emerging indicated that the parasites passed the winter in some numbers. When considered in connection with the percentage of parasitism of 58.+ per cent for the eggs of the fall brood of *Datana integerrima* in 1907, it appeared that the parasites had a fine chance to hold this insect in check during 1908. Unfortunately the writer was compelled to leave the State at that time and the observations could not be completed.

Aside from these observations, Gossard[1] wrote, under natural enemies of *Datana integerrima*, that "the eggs are attacked by a hymenopterous parasite."

H. A. Morgan[2] recorded *Telenomus gossypiicola* Ashm. as "an active egg-parasite in Louisana," but the writer is inclined to believe that he had *Telenomus sphingis*, as these two species run very close together in Ashmeads tables.[3]

Later Herrick,[4] writing of *Datana integerrima* said, "There is also a small insect that is parasitic on the eggs of the moth. Professor Morgan says that out of one batch of twelve hundred eggs every one was parasitized."

[1] H. A. Gossard. Bul. 79, Fla. Agr. Exp. Sta., p. 301, 1905.
[2] H. A. Morgan. Bul. 69, 2d sér., La. Agr. Exp. Sta., p. 882, 1902.
[3] W. H. Ashmead. Bul. 45, U. S. Nat. Mus., p. 144, 1893.
[4] G. W. Herrick. Bul. 86, Miss. Agr. Exp. Sta., p. 21, 1904.

A NEW GENUS OF STREBLIDÆ.

By Charles H. T. Townsend.

The following form is of exceptional interest as representing a new genus of ancient affinities in the very interesting Pupiparous family *Streblidœ*, as coming from the little-known region of northwestern Peru, and as inhabiting a host hitherto known only from the description and figures published in 1877 with record of occurrence at Tumbez, Peru, on the Gulf of Guayaquil, but rediscovered by the writer at Piura.

SNYTHESIOSTREBLA gen. nov.

Approaches *Trichobius* in wing character and *Megistopoda* in hind legs. Thorax conspicuously broader than long, gently widened posteriorly. Scutellum short, subcrescentic, bulged posteriorly, gently concave on anterior border. Abdomen narrowed, segments not distinct. Extra hind crossvein between fifth and sixth vein opposite to end of first vein, only a little distad of small crossvein, latter close to origin of third vein whose base is bent abruptly costad from it, no emargination of distal wing-border; the wings elongated, about two and one-half times as long as broad, fully developed and functional, with the characteristic six longitudinal and three crossveins, the first vein ending but slightly beyond middle of wing, thus contrasted with both *Strebla* and *Trichobius*. Front legs very short, middle legs a little longer, the femora, tibiae and tarsi in these about equal as to length in same pair of legs; hind legs nearly three times as long as front ones, the hind metatarsi much elongated, the hind coxae enlarged and elongated; last tarsal joint of all feet moderately elongated and widened, the claws not toothed. Eyes present. Antennae normal. Habitat on the very rare and little-known bat, *Amorphochilus schnablii* Peters, ranging from Piura to Tumbez, in the northern coast region of Peru.

Type, *Synthesiostrebla amorphochili* n. sp.

Synthesiostrebla amorphochili new species.

Length of body, fully 1 mm.; hind legs, scant 1.5 mm; front legs, 0.4 mm.; middle legs, 0.5 mm.; wings, 1.2. mm. One specimen, probably female, from bat collected at Piura, Peru, February 1, 1911 (Townsend).

Entire insect pale brownish-yellow, abdomen more deeply colored, claws black. Front edge of mesoscutum with a pair of strong teeth on median line directed anteriorly and fitting into corresponding grooves in back of head. A pair of strong bristles, longer than any others on body, situated near hind margin of mesoscutum on median line in front of scutellum. Body and legs with many stiff short sharply-pointed bristles, a few also on costa. Wings clear, veins yellowish. Shorter bristles over legs, wing costa, and on distal borders of the leaf-like palpi.

The host was determined by Mr. E. W. Nelson, of the Biological Survey, Washington.

Regarding the venation of the *Streblidæ*, it must be noted that the veins appear to have evoluted outwardly or distally, especially the inner basal veins, greatly elongating the second and third basal cells from the Holometopan type by drawing their crossveins nearer to the wing-tip. Hence what is called in the above description the extra hind crossvein is probably the crossvein of the anal or third basal cell, and the first or outer hind crossvein (between the fourth and fifth veins) is probably the cross vein of the second basal cell, while the true (Holometopan) hind cross vein has been lost. At all events these second and third basal-cell crossveins are no longer apparent in their ordinary position (judged by the Holometopan type) in the *Streblidæ*, and the general outward trend of all the veins exhibited by this family supports the above conclusion. The effect has perhaps been accelerated by a concurrent shortening of the wings, as suggested in Aspidoptera.

Synthesiostrebla stands farther removed from *Strebla* on both venational and mesoscutal characters than does *Trichobius*. It represents a relatively less outward evolution of the veins than that shown in any hitherto known Streblid genera, and thus appears to be a persisting fragment of an older and probably an ancient Pupiparous stock. The fourth, fifth and sixth veins do not reach the wing border, stopping farther from latter than in *Trichobius*, while even the third vein stops slightly short of apical border. The form is in all probability a relic by direct descent from an old stock stranded in western America since the Mesozoic—a stock that accompanied the northward dispersals between Antarctic and South America during or prior to the Cretaceous.

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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON

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MEETING OF FEBRUARY 6, 1913.

The 265th regular meeting of the Society was entertained by Mr. August Busck at the Sængerbund Hall, 214 C st. N.W., on the evening of February 6, 1913, and there were present Messrs. Baker, Barber, Busck, Caudell, Cory, Craighead, Cushman, Duckett, Fisher, Gahan, Gill (T.N.), Heidemann, Heinrich, Hood, Hopkins, Knab, McAtee, McIndoo, Malloch, Middleton, Popenoe, Rohwer, Sanford, Sasscer, Schwarz, Shannon, Snyder, Timberlake, Walton, and Wood, members, and Messrs. R. F. Bower, de la Torre Bueno, W. T. M. Forbes, J. R. Horton, V. King, W. O'Connor, C. E. Pemberton, H. J. Quayle, W. F. Turner, and W. H. White, visitors. President Busck occupied the chair. The minutes of the preceding meeting were read and approved.

Mr. Rohwer mentioned the resignation of Messrs. S. E. Crumb and Mr. H. L. Viereck as members from the Society.

Mr. Cushman proposed the name of W. F. Turner for active membership.

Mr. Rohwer read a letter from Mr. J. C. Crawford resigning as editor of the PROCEEDINGS. Mr. Schwarz moved that the resignation be accepted; seconded by Mr. Knab; carried. Mr. Rohwer then said that the Executive Committee recommended the election of Mr. W. D. Hunter as editor. On the motion of Mr. Schwarz, seconded by Mr. Knab, Mr. Hunter was duly nominated and elected.

The first paper of the evening by Mr. Nathan Banks on "New Costa Rican Arachnids," which was read by title and the second, by Dr. A. D. Hopkins "On the Classification of Scolytid Beetles," will be published later.

The third and last paper was by Mr. August Busck which follows.

TWO MICROLEPIDOPTERA INJURIOUS TO CHESTNUT.

By August Busck.

Bureau of Entomology.

Sesia castaneæ, new species.

Labial palpi yellow on the underside; above black, sprinkled with yellow scales; apical half of third joint all black. Antennae black with the tips bronzy fuscous. Face bluish black with the face before the eyes broadly white. Head black. Thorax metallic bluish black with two narrow lateral stripes yellow; in the female also with posterior edge narrowly yellow. Forewings alike in the two sexes, transparent, with bluish black scaling on the veins, slightly mixed with golden yellow scales; cilia purplish black. Hindwings transparent with narrow black veins and with yellow costal edge, which shows through the membrane of the forewing when in natural position; cilia purplish black. Abdomen deep bluish black with posterior half of fourth joint yellow on the underside; in the female the extreme edges of third and fourth joints are also narrowly yellow on the dorsal side; the base of the abdomen laterally yellow; the inner side of the male claspers dark ochreous. Legs bluish black with narrow yellow annulations at the end of the joints; the tarsi of the females dusted with yellow.

Habitat: Lynchburg, Virginia, and Snow Shoe, Pennsylvania, F. C. Craighead, coll.

Foodplant: Chestnut.

Type: U. S. Nat. Mus. No. 15505.

Bred from the trunks of chestnut by Mr. F. C. Craighead. The fullgrown larva is about half an inch long, yellowish white with light brown head and with yellowish thoracic shield and thoracic legs; setae short and pale; hooks on abdominal feet in two rows with from ten to twelve hooks in the posterior and from twelve to sixteen in the anterior row.

The adults emerged April 12, and May 21, 1912.

The species is nearest in size and coloration to *S. pictipes*, Grote and Robinson, and has been mistaken for this species, which according to the earliest records is injurious to plum, cherry and peach; Grote himself identified (Bull. U. S. Geol. Surv., vi, p. 287, 1881) the species bred by Bailey and Kellicott, from plum and cherry (Can. Ent., xiii, p. 7, 1881) as his *S. pictipes*.

Beutenmuller records it also from chestnut, but this record was undoubtedly caused by a misidentification of the present species. The chestnut species may be distinguished from *S. pictipes* by the

larger white, not yellow, cheeks, by the black, not yellow, collar and by the absence of yellow on the second joint of the abdomen.

Ectoedemia castaneæ, new species.

Palpi and lower face ochreous. Upper face and head black. Antennae blackish brown with narrow yellow annulations and with large milk-white eyecaps contrasting strongly with the dark tufted head. Thorax blackish brown sprinkled with ochreous scales, especially posteriorly; posterior tip ochreous. Forewings blackish brown liberally sprinkled with bluish white scales. Cilia fuscous. Hindwing dark fuscous, blackish along the costa with lighter ochreous fuscous cilia; in the males with a strong yellowish costal hair tuft. Abdomen dark fuscous with ochreous anal tuft and ochreous underside. Legs light silvery ochreous. Alar expanse: 7.5–8 mm.

Habitat: Vietch, Virginia.

Type: U. S. Nat. Mus. No. 16333.

The life history of this species has recently been ascertained by Dr. A. D. Hopkins and Mr. T. E. Snyder, who have bred it from small galls on young twigs of chestnut, reminding one in form and size of the egg masses of the forest tent-caterpillar.

The larva resembles that of *Nepticula;* the head is small, normal, retractive into the first thoracic segment which lacks all trace of feet; the other thoracic feet and all the abdominal feet are represented by rudimentary processes; such are found on joints 3 and 4, 6, 7, 8, 9, 10, and on joint 13 while they are faintly indicated on joint 5; thus joints 11 and 12 are the only ones beside 2 which have no trace of feet. In *Nepticula* the formula is ". . 2 . 6 . .".

The species is close to *E. obrutella* Zeller, which species must be included in the present genus, but differs in the darker thorax and forewings. *Obrutella* was described in the genus *Trifurcula*[1] but shows some important difference in pterogostic characters from the type of this genus, *T. pallidella,* of Europe (fig. 1b).

The life history of *Trifurcula* is not known.

The leaf mining genus *Nepticula*[2] (fig. 1c), typically shows a reduction of the venation by the absence of vein 8 and of the cubital veins; in some of the larger blotch-making species of the genus however, these veins are present or at least indicated and the venation is practically that of the gall-making *Ectoedemia.*

[1] Verh. Zoo-bot. Gesell. Wien, XXIII, p. 316, 1873.

[2] I use the geonym *Nepticula* advisedly, instead of *Stigmella* Schrank, as adopted by Lord Walsingham and Mr. Durrant. The earlier name, *Stigmella,* is a *nomen nudum,* whether by accident, as held by Lord Walsingham or not, and is for that reason in my opinion not available as a substitute for *Nepticula* Zeller.

These three genera, *Ectoedemia* (fig. a), *Trifurcula* (fig. 1b), *Nepticula* (fig. 1c), together with *Scoliaula* Meyr. (fig. 1d), form a well separated group among the *Tineæ aculeatæ*. All the species are among the smallest of the Lepidoptera, averaging from 4 to 9 mm. in alar expanse. All have a many spined frenulum in both sexes.

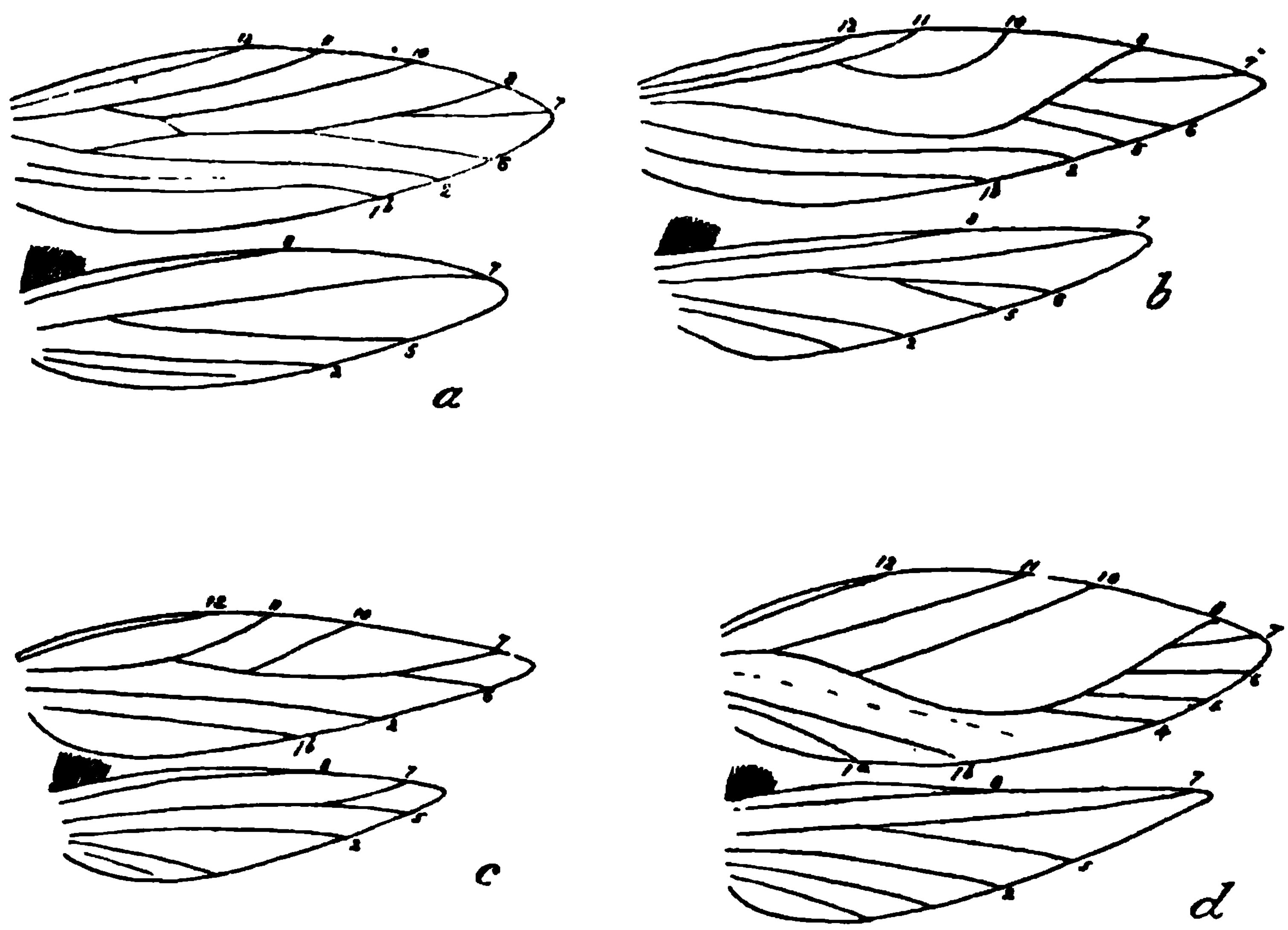


Fig. 1. a, *Ectoedemia populella* Busck; b, *Trifurcula pallidella* Zeller; c, *Nepticula microtheriella* Stainton; d, *Scoliaula quadrimaculella* Boh.

Under notes and exhibition of specimens Mr. Schwarz read by title the following note by Mr. Chas. R. Ely, of Frederick, Md.:

THE FOOD PLANT OF CLEONUS CALANDROIDES RAND.

By Chas. R. Ely, *Frederick, Md.*

About the 10th of August, 1912, my daughter while playing on the sea beach, near East River, found the larvæ of a weevil living in the roots of *Cakile endetula* Bigel. Because of her interest in the insect we collected, on August 14, a large number of the various stages, from larva to adult. Specimens which later emerged from the pupæ were identified by Mr. E. A. Schwarz as *Cleonus calandroides* Rand.

So far as we observed the larvæ live wholly in the roots, and that portion of the root lying within 2 or 3 inches of the surface of the ground is most subject to attack. Transformation takes place within a cocoon, constructed, chiefly of small shreds of plant fiber, which is built up in a longitudinal excavation, made by the larva in one side of the root. About one-third of this cocoon lies outside of the root itself and is in sharp contrast to it because of its much darker color.

As stated above, all stages, from half grown larvæ to the adult beetles were to be found on August 14, and quite a number of the empty cocoons were also to be seen.

The beetles were evidently present in very great numbers, as practically every root of a Cakile plant that was examined, over a strip of beach a quarter of a mile long, was found to be more or less attacked by them.

Mr. J. R. de la Torre Bueno exhibited and remarked upon the following insects:

Neuroctenus simplex Uhl., an Aradid, two specimens of which had mites fastened to the underside of the body, in one case one specimen on the connexivum, and in the other case two on the mesosternum, between the legs. The eggs of this species were also shown, fastened in clusters to the inner side of bark. Two clutches were parasitized by a minute Proctotrypid, which showed dark through the corium of the infested ova, and a mounted specimen of this was shown, which flew out from the home of the bug as the bark was lifted. *N. simplex* is commonly found under the bark of dead oak saplings. The female would seem to brood her eggs, to judge by the actions of two found over the two batches, from one of which the red young were emerging. The actions of the females gave color to the interpretation of maternal solicitude put upon her position with the abdomen extended over the egg masses. This is a very rare phenomenon in the Heteroptera, the best attested example being the classic instance of the European Cimicid, *Rhaphigaster nebulosa* Poda (*griseus* Fabr.)

A specimen of *Sinea spinipes* H. S. taken at Yaphank, Long Island, New York, in the pine region of the island. This is the most northern record of this species, described originally from South America and later recorded from western United States, and heretofore naturally considered strictly southern.

Eggs and nymph of *Melanolestes abdominalis* were also shown. This large Reduviid lives under stones and lays its eggs in the earth. The crown of filament that surmounts each egg is flush with the surface. The ova shown were secured from specimens in captivity.

An egg-mass of *Microvelia americana* Uhl., which had been deposited on the sides of an aquarium, just above the water-level was brought to the attention of the meeting. From aquarium observations it has been concluded that this tiny semi-aquatic bug deposits its eggs on stones or sticks at the water's edge, but not under water. The eggs are laid in a clear jelly-like glue, which secures them to the objects on which they are deposited.

MEETING OF MARCH 5, 1913.

The 266th regular meeting of the Society was entertained by Mr. C. L. Marlatt at his home 1521 16th street N.W., on the evening of March 5, 1913, and there were present Messrs. Baker, Burke, Busck, Cory, Craighhead, Cushman, Duckett, Fisher, Gahan, Green, Hall, Hood, Hopkins, Howard, Hunter, Hyslop, Knab, McIndoo, Marlatt, Popenoe, Quaintaince, Rohwer, Sanford, Sasscer, Shannon, Siegler, Snyder, Webb, Webster, and Wood, members, and Messrs. H. Bradford, W. E. Edmonston, D. G. Fairchild, J. R. Horton, J. M. Miller, A. Rosenfeld, H. B. Scammel, and J. F. Strauss, visitors. President Busck occupied the chair. The minutes of the preceding meeting were read and approved.

Mr. W. F. Turner was elected an active member of the Society.

Dr. Hopkins proposed the names of J. M. Miller, Joseff Bruner, and W. D. Edmonston for corresponding members. In accordance with the by-laws these names were referred to the Executive Committee for action.

The first paper of the evening was "Monsters of our Backyard," by David Fairchild. This very interesting paper, which has been published in the National Geographic Magazine, was illustrated with lantern slides made from greatly enlarged photographs of certain common insects in characteristic attitudes. At the conclusion of Mr. Fairchild's talk, Mr. Marlatt moved that the Society

extend Mr. Fairchild a vote of thanks for exhibiting these pictures for the first time to its members.

The following paper was read by title: "Pseudomasaris Bred in California" by T. D. A. Cockerell.

PSEUDOMASARIS BRED IN CALIFORNIA.

By T. D. A. Cockerell.

A number of years ago at Pecos, New Mexico, my wife and I found *Pseudomasaris vespoides* (Cresson) in quantity, visiting flowers of *Pentstemon.* Numerous efforts to follow the wasps to their nesting places were wholly unsuccessful, much to our disappointment. I was therefore greatly interested to receive, a few days ago, a *Pseudomasaris* from Professor D. E. Merrill, with the information that it had been bred by Dr. George Robertson at Redlands, California, from a nest having the shape of an inverted cone, and composed principally of sand, fastened to the stem of some plant. In being fastened to the stem of a plant, the nest resembles that of *Celonites*, but apparently differs in the openings being directed upwards instead of downwards, as well as in the shape. The insect is very close to the Rocky Mountain *P. vespoides*, but apparently subspecifically distinct.

Pseudomasaris vespoides robertsoni, new subspecies.

Female: Like *P. vespoides,* but with the sculpture of the mesothorax not so coarse; scutellum with the small punctures closer and finer, the large ones few and very weak; median black lobes of abdominal bands rather more extensive; last ventral segment of abdomen with a median black stripe, broadening basally, on its basal half.

Habitat: Redlands, California, June, 1912 (G. Robertson).
Type: Cat. No. 15529 U. S. N. M.

Meeting of April 3, 1913.

The 267th regular meeting of the Society was entertained by Mr. E. A. Schwarz in the Sængerbund Hall, 314 C street N.W., on the evening of April 3, 1913, and there were present Messrs. Baker, Banks, Barber, Burke, Busck, Caudell, Cory, Craighead, Cushman, Dyar, Fisher, Gahan, Hall, Heidemann, Heinrich, Hood, Hopkins, Howard, Hunter, Jennings, Knab, Meyers, Pierce, Rohwer, Sasscer, Schwarz, Shannon, Snyder, Turner, Walton, and

Wood, members and Messrs. Vernon Bailey, Adam Böving, H. G. Dyar, W. T. M. Forbes, and H. B. Kirk, visitors. President Busck occupied the chair.

Mr. Rohwer reported that the vote taken in accordance with the constitution for the election of Honorary Members resulted in the unanimous election of Dr. David Sharp of England, and Dr. J. H. Fabre of France. Mr. Rohwer also reported that the Executive Committee had acted favorably on the names of J. M. Miller, Joseff Bruner, and W. D. Edmonson for corresponding membership and on a vote of the Society they were duly elected.

The first paper of the evening "The Insect Host of Forest Malaria" by Dr. Adolph Lutz was read by Dr. L. O. Howard.

THE INSECT HOST OF FOREST MALARIA.

BY DR. ADOLPH LUTZ, *Rio de Janeiro.*

I see by the PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF WASHINGTON that Mr. F. Knab read a paper, "The Dependence of Disease Transmission by Blood-Sucking Insects Upon Habits." When Dr. L. O. Howard cited a paper of mine Mr. Knab declared that he had just discussed this paper from his present view point with Dr. Dyar and they had come to the conclusion that I had misinterpreted the facts. A similar statement is repeated in a paper in the Journal of Economic Entomology. To explain this singular conclusion Mr. Knab thinks it highly probable "that the men observed by Lutz already harbored malaria in a latent form when they came into the region and that the exertion and exposure incident to the work caused the irruption of the disease."

If such an etiology of a typical epidemic was possible, which no competent person would admit, the people living here and interested in the case would not have waited for two laymen to think of it and I would not have troubled to find a satisfactory explanation for a puzzling fact. Mr. Knab however continues:

"It is a well known fact that in the tropics most persons apparently in good health have latent malaria." Leaving alone the fact that the place of observation and the places where the patients came from have not a tropical climate, the statement itself is utterly erroneous and about equal to the statement that in hot countries everybody is suffering from liver disease. After excluding typhoid fever and other pyrexias with different etiology, it has become evident that malaria is very much localized and by no means generally prevalent, even in tropical countries. In fact it

is wanting in many places where there are Anophelidæ, which are by no means ubiquitous.

My paper on forest malaria has been everywhere accepted without contradiction, and since I wrote it the facts have been confirmed by several people. Dr. Chagas observed another epidemic under absolutely similar conditions and near the same place and authorized me to state that he is convinced of the correctness of my explanations, which is of interest, as he has observed several epidemics of malaria in different places and studied the Anophelidæ found. I myself have seen another epidemic and there are some more on record showing the occurrence of epidemical malaria in places where there are plenty of epiphytic Bromeliaceæ and no swamps. It is now a generally recognized fact in this country that all the great works of engineering, where hundreds and thousands of workmen have to sleep in the open air, will lead to epidemical outbreaks of malaria, even in quite uninhabited regions where there are swamps due to the perodical inundations of the rivers. The observations in the uninhabited mountain woods of the coast range are quite analogous and just as certain, with the difference that the higher places get infected later and never in the cold season. On the other hand the very same workmen have done the same work in the dry Campos regions and in the woods of the interior where there are no Bromelia Anophelidæ without the slightest malarial manifestations.

Of course a few chronic malaria patients must be present and these will be found amongst the workmen who previously took part in similar work, but these people, far from being quite healthy, could be picked out and excluded, as I proposed long ago.

In this country *Cellia argyrotarsis* is much more responsible for the spreading of malaria than *albimana*. Both the species are frequent in uninhabited places and only come near the houses when these are built in swampy regions, excepting very few stragglers. That they do not want or prefer human blood is shown by the quite well known fact here that they prefer the horse to the rider and large numbers of them might be caught on horses by persons who do not get bitten themselves. The same is true for all other species of Anophelidae.

Now it is quite natural that the workmen in uninhabited places where big game is rare will attract the mosquitoes and if they stay long enough in the same place the epidemic will follow the increase of the infection in the mosquitoes who themeslves augment in number through the facility of alimentation. It is a well established fact that a species might be an excellent intermediate or definite host of a parasite quite new to the country because the host for the other stage has only been introduced recently.

The second paper of the evening, by Mr. Knab, in reply to Dr. Lutz, was read by Dr. Dyar.

THE CONTENTIONS REGARDING "FOREST MALARIA."

By Frederick Knab, *Bureau of Entomology.*

Dr. Lutz's protest against my remarks on malaria transmission by *Anopheles boliviensis* Th.(=*A. lutzii* Th.) is interesting and stimulating. It seems almost superfluous to say that I have the greatest admiration for the work of Dr. Lutz. as I am sure have all who have become acquainted with it. Personally I have derived much inspiration from the writings of Dr. Lutz and to discredit him was far from my intention. The criticism to which he objects resulted naturally through the defense of an idea which I still believe is correct in principle. The question is a zoölogical one rather than a medical one, the pathogenic character of the parasite being merely an incident and the fact that Dr. Lutz is a skilled naturalist as well as a physician leads me to hope for points of contact. I must reiterate, for the benefit of careless readers, that my remarks were, from the beginning, intended to cover only blood-parasites having life-cycles in alternate hosts and involving a blood-sucking insect. It may be here appropriately pointed out that a train of thought very similar to my own led Grassi to his great discovery, which was not, as generally formulated, that *Anopheles* transmits malaria, but that definite species of *Anopheles* do so. He conceived the idea that the transmitting blood-sucking insect and the disease must show the same distribution, and this corresponds very closely to what I have formulated. There is, therefore, really nothing new or startling in my contentions. What I do claim, however, is that this aspect should not be neglected by investigators.

I have again carefully read Dr. Lutz's famous paper and also his present communication. From these it would appear that in the question under dispute, which involves the principle formulated by me, we agree on every point but one, namely the question of the insect host in the malaria epidemic under discussion. I am glad to admit that offering an explanation of conditions at such a distance, and concerning which I had no accurate information, was rash; but it was only a suggestion and is now withdrawn in the face of the facts brought forward by Dr. Lutz. We find ourselves on common ground in believing that the malarial outbreak observed among a large gang of workmen encamped in a previously uninhabited forest was not endemic there, but was brought into the locality by such of the workmen as already harbored the malarial parasites, and that it was transmitted from man to man by a spe-

cies of *Anopheles*. I am, however, unwilling to believe that a species of *Anopheles* which is peculiar to uninhabited forests and under normal conditions can not obtain human blood should forthwith become the host of a blood-parasite of man. It is true that such a case might occur and that we may have it before us in the one under discussion, but in my opinion this would be so exceptional that it would have to be very fully proven.

There is every indication that the host-relation between the malarial parasites and certain species of *Anopheles* is conditioned by a very fine physiological adjustment. Thus it has been commonly observed that of a number of species occurring in a given locality and all obtaining their blood-meals from the same source, some serve as efficient hosts for the parasites while other species simply digest the parasites with the blood. Very often the commonest *Anopheles* of a region will not be the one to serve as host. This is the case, for example, with our *Anopheles punctipennis*, and it is well established that *A. rossi* holds a similar relation in the Orient. James and Liston may be quoted to good advantage in this connection:

We have already mentioned that some species of "anopheles" are better malaria-carriers than others, and apart altogether from the fact that "anopheles" may be abundant in a place without there being any malaria at all, it often happens that the species which is present most abundantly is not the one which is carrying malaria at the time. It is, however, a difficult matter to estimate the relative abundance of different species in any place, for some are much more easily seen than others, and the habits which some species have of secreting themselves among the straw of a thatched roof and of resting only upon objects which are as nearly as possible the same colour as they are themselves, are very important. In order to exemplify this, it seems worth while to recount an instance which happened in our experience. In the malarious village of Ennur in the Madras Presidency, *A. rossi* was so abundant that on almost every straw of the thatched roof of every house three or four specimens of this species were resting. A careful search in the ordinary way did not reveal the presence of any other species, and it is certain that, had there been no other object in the search than the mere determination of the species of "anopheles" present in the village, the observer would have gone away quite satisfied that *A. rossi* was alone present. But the village was an extremely malarious one, and knowing that *A. rossi* was an inefficient carrier of malaria in nature, he was unwilling to believe that no other species was present in the houses. Fixing his mind, therefore, upon the thought that he was looking for *A. culicifacies* and not *A. rossi*, he again commenced the search with great care, and was rewarded not only by detecting the presence of *A. culicifacies*, but by catching a sufficient number of this species during several days' work, to prove that it was the species respon-

sible for the prevalence of malaria in the place and not the very much more abundant species *A. rossi*.[1]

Now we find that upon a short visit of investigation Dr. Lutz found a single species of *Anopheles* in the locality and at once concluded that this was responsible for the malarial outbreak. "Ich war sofort überzeugt, die gesuchte Mückenart gefunden zu haben obgleich damals über die Charaktere der Malariaüberträger noch nichts bekannt war. Als bald darauf erkannt wurde, das dieselben unter den *Anopheles*-Arten zu suchen seien, sah ich mit Befriedigung, das die neue Art ein *Anopheles* war."[2] He assumed that no other species of *Anopheles* could be present in the locality because it appeared to him that there were no suitable breeding-places other than the bromeliads. In fact I have found three species of *Anopheles* breeding in small pools in the bed of a mountain stream, where the topographic conditions must correspond very closely with those outlined by Dr. Lutz, and two of these species (*A. argyritarsis* and *A. eiseni*) occur also in southern Brazil. I have repeated these observations on two visits to Córdoba, Mexico (June, 1905 and December, 1907, to April 1908), and found the larvæ on these occasions in a canyon which is virtually scoured out by the mountain torrent after every heavy rain. Similar observations are at hand from the rapid streams in Panama. Furthermore it may be pointed out that during a five months stay at Córdoba I did not capture a single adult *Anopheles*, and had I not collected the larvæ I should have been led to conclude that no *Anopheles* occurred in that locality. It may therefore be pardonable if I express my incredulity that no other than the bromelicolous *Anopheles* were present in the locality described by Dr. Lutz. Aside from this possible or even probable presence of other *Anopheles*, which admittedly might be in such small numbers as to be a negligible factor, there may be still other sources of error. The question naturally arises: How completely and for how long a period were the workmen confined to the forest habitat? Did they not, singly or in small parties, take holidays outside that zone or make nocturnal visits to taverns and pleasure resorts beyond its confines? From what we know of the habits of *Homo* in general we have a right to suspect this! In short, the claim that a wholly "wild" species of *Anopheles* should become an efficient host of a human malarial parasite seems to me so improbable that no evidence other than the demonstration of the parasites in the salivary glands of the mosquito will induce me to accept it.

[1] A Monograph of the Anopheles Mosquitoes of India (first edit.), p. 53–54, 1904.
[2] Centralbl. f. Bakteriol. etc., 1 Abt., Originale, vol. 33, p. 283, 1903.

Lest I be accused of ignorance of the literature, I must state that I have examined a paper by Galli-Valerio in which that author claims to have found oöcysts of the malaria parasites in the stomach-walls of a specimen of *Anopheles boliviensis*.[1] I am unable to accept Galli-Valerio's determination. The specimens were brought to him from the State of Paraná by a friend and were in very bad condition ("qui malheureusement étaient dans mauvais état de conservation"). Even a very close student of American mosquitoes might hesitate to positively identify such specimens, and I am not aware that Galli-Valerio had previously given any attention to American mosquitoes! Dr. Arthur Neiva has rejected Galli-Valerio's results on other grounds: "For the cysts found by Galli-Valerio in mosquitoes preserved in alcohol, which had been sent to him from Paraná, can hardly be looked upon as evidence, because under the circumstances it would be hardly possible to distinguish between hæmatozoans originating from man or from birds."[2]

As to my statements concerning the association of *Anopheles albimanus* with man, it may be that I have been too positive. But the available observations, and new ones have come to hand since my papers were written, seem to show that my contention has foundation in fact. Naturally the association is not an intimate one, such as it is in the case of *Aedes calopus* and *Culex quinquefasciatus*, and this I indicated in the beginning. The reason is obvious enough in the long period during which the malarial parasites are present in the human circulation. We now know that *Anopheles albimanus* will fly long distances from breeding-places to obtain blood and fly back again to lay eggs, just as do certain species in India which are known to hold a similar relation there. Recently veritable migrations of this nature have been observed.[3] In them the *Anopheles albimanus* were not carried involuntarily by the wind, but were governed in their movements by the food supply for the adults and by the available breeding facilities. Finally there would seem to be a variation in the ratio of *Anopheles albimanus* to other species of *Anopheles*, according to the size of the settlements (within certain limits!) and the consequent available

[1] Notes de parasitologie. Sur la présence d'oocystes chez *Anopheles Lutzi*, Theobald. Centralbl. f. Bakteriol. etc., 1 Abt., Orig., vol. 35, p. 85, 1904.

[2] Contribuição para o estudo dos dipteros. Observaçãos sobre a biologia e systematica das anofelinas brazileiras e suas relaçãos com o impaludismo. Beitrag zur Kenntniss der Dipteren. Beobachtungen über die Biologie und Systematik der brasilianischen Anophelinen und deren Beziehungen mit der Malaria. Mem. Inst. Oswaldo Cruz, Rio de Janeiro, vol. 1, fasc. 1, p. 76, 1909.

[3] Rept. Dept. Sanitation, Isthmian Canal Comm., for January, 1913, p. 43–46.

food-supply in man and animals. I do not think that this difference is explainable by topographic conditions, but I believe that where conditions are otherwise favorable it is governed by the consideration just mentioned.

Finally it must be admitted that, in formulating what I believe to be an important principle, I have been somewhat dogmatic. But the nature of the subject, and, except in the case of the most pronounced examples, the dearth of observations bearing upon it, have made this necessary. If I have caused students to think, to criticise, and perhaps to investigate from a new point of view, I shall feel that I have done something worth while.

——In connection with the foregoing papers Dr. Dyar made the following remarks: "To state the matter concisely, certain workmen engaged in railroad construction in a wild, wooded country, were afflicted with malaria. Dr. Lutz, investigating the outbreak, found no other *Anopheles* present but the species breeding in the epiphytic bromeliads in the forest, *A. lutzii* Theob. He concluded that they were responsible for the outbreak of the disease among the workmen.

At the time of his investigation, it was not known to what a degree of specialization the malarial relation had established itself. It was thought that malaria in man was to be considered as conveyed by *Anopheles* as against other mosquitoes. Lutz's conclusion was, therefore, at the time a natural and plausible one. But we now know that the malarial relation is a highly specialized one. Each kind of malaria is conveyed usually by but one or two species of *Anopheles* in a locality. Often we have in a given locality several species of *Anopheles* present, only one of which is capable of carrying the form of malaria prevalent there. Mr. Knab has pointed out that for such a delicate relation to have established itself, an habitual association of the vertebrate host and mosquito host must have preceded; in other words domestic or semidomestic *Anopheles* only will be found to be malaria carriers. This view renders Dr. Lutz's conclusion less plausible than when viewed in the former light, and, in conversation with Mr. Knab, we had concluded that Dr. Lutz's explanation was probably erroneous. Certainly, in view of recent discoveries, Dr. Lutz's explanation is at least unlikely and unusual and can be accepted only after strict proof.

It seems to me that there are three possible theories to account for the outbreak of malaria observed by Dr. Lutz. First, that the true carrier was overlooked. Second, that the disease was spread

by *Anopheles lutzii* from a latent case among the workmen, and, after the incubation period, first in the mosquito, then in the man, appeared generally among the men as a result of the bites of the infected *lutzii*. Third, that there exists a form of malaria among wild animals in the forest, conveyed by *A. lutzii*, and that man is subject to this disease when specially exposed by residence in the forest and so bitten by the mosquitoes already infected from the wild animals.

In regard to the first alternative, it is difficult to discuss possible sources of error at this distance from the facts, distance both of time and space. It is, however, true that the ordinary malaria carrier may be overlooked, especially if one is possessed by an original idea or theory one wishes to establish. The men may not have been as strictly confined to the camp as supposed, and there are a thousand and one possible chances of error, any one of which may have been operative. Personally I believe that Dr. Lutz was the victim of some error of this kind.[1]

In regard to the second alternative, the chance that a wild species of *Anopheles*, never before having carried human malaria, should be in a condition to do so when malaria cases were presented, seems remote. The condition is possible, but unlikely, and should only be accepted after rigorous proof. The ordinary malarial parasite should be proved to develop in *Anopheles lutzii*.

The third alternative is no more than an interesting possibility. No malarial organisms are known to inhabit wild animals and be transferable to man, though it seems possible that there might be parasites of monkeys, conveyed by forest *Anopheles*, and man perhaps susceptible to them. If such a relation exists, it could be demonstrated by suitable study, but I think we are not entitled to invoke it as an explanation of the present case merely on a possibility.

As between the second and third alternatives, there should be at

[1]It seems to me probable that some ordinary *Anopheles* like *A. albimanus* or *argyritarsis* was really present, but overlooked by Dr. Lutz. It appears from his article that he was too much impressed by the apparent lack of ground breeding-places. He found species of *Janthinosoma* and others present, which are exclusively ground-pool breeders, but he classifies them as occasionally breeding in bromeliads. Apparently he accounts for their presence by their supposed faculty of occasionally so breeding; but this is surely an error. When *Janthinosoma* could be present there must certainly have been abundant opportunity for the breeding of ordinary *Anopheles*.

once evident a difference in the time of appearance of the disease after the men were encamped in the forest. In the second case the disease would appear much later than in the third. But the first alternative might show either a long or short period, according to what the actual mode of infection was, whether by the infection of local overlooked *Anopheles* from latent cases among the men themselves or by infection of the men individually outside of camp by already infected mosquitoes.

But whatever explanation be the true one, the burden of proof rests upon the investigator, in this case Dr. Lutz, and we have the right to expect that proof should be complete or to reject the explanation offered."

——Continuing the discussion Mr. A. H. Jennings said: "In 1909, a survey of the basin of the Chagres River in Panama was made by the engineers of the Isthmian Canal Commission. The parties engaged on this work suffered from malaria and in March of that year I was instructed to make a general investigation of the mosquito fauna of the region with special reference to the sources of malarial infection. The Chagres, Boqueron and Pequini rivers were ascended, the latter to within a few miles of its headwaters, and a careful study was made of mosquito conditions along all of the streams traversed.

Except along their lower courses, the country through which these rivers flow is uninhabited and seldom penetrated by the natives, who venture into the interior during the height of the dry season only. The dry season is so only in name in the country surrounding the sources of the rivers comprising the Chagres system; heavy rains and sudden floods occur even during this season and few days pass without more or less rain.

I found *Anopheles albimanus* Wied., the principal malaria carrier of the Panama region, to be entirely absent from the uninhabited country and this was not from the lack of suitable breeding places, as many such were found. The only species of *Anopheles* present along the upper reaches of the rivers were *eiseni* and *neivai*. The former I found breeding with some freedom in pools at the rocky edges of the rapid streams and also in tree-holes, both situations being characteristic of the species. *Anopheles neivai* was found in the leaf axils of bromeliads and was not found in any abundance.

Both of these species are, in my experience strictly sylvan in habitat, never being found beyond the confines of dense bush. Neither I nor any of the party were attacked by *Anopheles* while traveling up or down the river, during which journeys we camped for a number of nights, entirely without protection, upon the dry shoals at the edge of the river, nor during the whole of my stay near the headwaters. There our protection consisted of a tent fly, open at the sides, pitched at the river's edge and before retiring at night we invariably sat about by the light of lanterns.

In spite of this exposure and the attraction offered by a considerable number of men and unscreened lights, we escaped attack. This may be partly accounted for by the comparative lack of abundance of mosquitoes, but their being unaccustomed to feed upon such hosts as man is also suggested as a factor. Some monkeys are present in these forests but large mammals of all kinds seem to be rare and represented principally by a few herds of peccaries, an occasional tapir and very rarely a deer. This may be a coincidence and the correlation, if it exists, between an uninhabited country and biting habits may be purely local, but it must be remembered that the country which Doctor Lutz describes is also normally uninhabited.

In spite of the conditions I have described, malaria was frequent and severe.

Malaria is endemic and highly prevalent in Panama and the Canal Zone outside of the controlled areas, and the engineers engaged upon the work had been exposed to infection for more or less lengthy periods during their Isthmian experience. The bush-cutters, boat-men, etc., were recruited principally from among West Indian negroes, long resident in the country and from the native population, more particularly from those of a migratory and roving disposition. From the known prevalence of latent malarial infection among the Panamanian population and from the habits of the class of men comprising the laborers attached to the party, as well as the antecedents of the engineers, it is safe to assume that practically every man of the five parties on the work, or possibly 150 men, carried with him into the bush a latent infection which required only hardship and exposure to develop an acute attack of malaria.

Exposure was experienced by all and included, besides great physical exertion, constant wetting from wading streams, often above the waist and every hour of the day and from drenching rains interspersed with periods of hot sunshine.

The conditions did not require the presence of malaria transmitting Anophelines and it is very clear that they played no part in causing the malaria from which the men suffered.

It seems to me that the situation closely parallels the one described by Doctor Lutz, as to character of forest, of men employed, conditions of work and mosquitoes involved, and that probably in that situation, as certainly in the one I have just described, the agency of forest-breeding anophelines in causing the occurrence of malaria may be safely excluded."

The remainder of the evening was devoted to the following paper by Dr. Hopkins and the discussion which ensued.

DISCONTINUOUS GEOGRAPHICAL DISTRIBUTION.

By Andrew D. Hopkins, *Bureau of Entomology.*

The discontinuous geographical distribution of animals and plants is a subject of special interest and importance to the taxonomist, the ecologist, the investigator of technical and economic problems, the student of geographical distribution and of the broader questions of evolution. If the same species or the same genus is established in many widely separated areas of the same country or continent or in the countries of different continents, we want to know something about the controlling factors which have brought it about.

I seems to me that the greatest difficulty to be met with in any comprehensive consideration of the subject from published data is the wide range of difference in the interpretation of specific distinction by taxonomists. There is often a marked difference of opinion on this fundamental question among those who work on the same group, but, when we consider the great difference in the interpretation of the range or limits of specific distinction among specialists in entomology or zoology, or in the entire field of biology, the complications in the difficulty of determining a reliable basis for comprehensive study or conclusions is overwhelming; in fact is prohibitive of reliable results. The genus of one author becomes a

subgenus species or subspecies of others or even a variety in the mind of the extremist who insists on the widest range for specific and generic characters. In an effort to define the distribution of such a complex, what are we going to do? Who are we going to accept as the authority? Naturally we will be inclined to accept the one who is nearest in accord with our individual opinions. If we are familiar with the genus or species, as the case may be, perhaps our opinion will be worth something as to the range of distribution, but suppose we are not familar with the genus or species of one author although we may be an authority on some other group, and we want to compare the distribution of his concepts with what we consider be to a species in our special group. In such a case our conclusions as to the governing factors in the distribution, will not be worth much beyond those based on our own interpretation of a species and personal knowledge of the range in its distribution. Yet broad generalizations have been based on just such uncertain data by biologists and zoologists in the past and will be in the future until some common standard is established.

If the leading biologists would meet on some common plane of reasoning by withdrawing from their fortified positions of extreme opinions (under a flag of truce if necessary), and would be guided by a sincere desire to get together on some of the more essential evidences and facts as to the units for comparison, something of real importance and value would be accomplished.

There has been a great deal of speculation on the probability that certain widely separated land masses of two continents were connected at some remote period, because of the presence in both areas of the same or similar genera and species.

The theory of circumpolar distribution during periods of uniform mild climatic conditions and of separations and isolations during the frequent glacial disturbances is a most attractive one considered by many to be a simple explanation of the occurence of the same genera and species in the boreal and temperate zones of two continents.

Undoubtedly the periods of glaciation which prevailed at various geological times in different parts of the world have had a marked influence on the distribution of plants and animals and especially certain discontinuous distribution. It is evident, however, that a number of examples in glaciated areas, in addition to those in areas out of the range of glacial influences, can not be explained by the glacial theory of distribution.

In looking for examples of discontinuous distribution, I must naturally give first consideration to insects and to the group of insects which has received my special attention, namely, the Scolytid beetles.

According to a system of classification which will soon be published, these beetles represent a superfamily, with representatives in every part of the world where woody plants grow. The four families are represented in all of the great faunal areas, while the subfamilies, genera, and species become more and more restricted with the descending rank. There are, of course, some notable exceptions to be found in genera and species which are more or less cosmopolitan. There are, on the other hand, a great many genera and species which are, so far as known, exceedingly restricted in their distribution.

While, as a rule, species and groups of closely allied species follow the distribution of their hostplant species, there are examples of species of insects which are more restricted in their distribution than that of their host plant.

There are also a great many examples of allied plant species in different countries being the hosts of the same genera and very similar species of insects. Among these, there are to be found some of the more striking examples of discontinuous distribution, especially under the broader conception of a species. Under a more restricted conception, the number of such examples is greatly reduced, so that under this conception the subject would resolve itself into one of discontinuous distribution of closely allied species.

The subject of so-called paired or parallel species is of special interest in connection with a study of geographical distribution. There are some striking examples of paired species in the genus *Dendroctonus* which if they occupied the same local faunal area would be difficult to separate on account for their close resemblance in structural characters. These paired species are *brevicornis* and *barberi*, *frontalis* and *arizonicus*, *mexicanus* and *parallelocollis*, *monticolæ* and *ponderosæ*, *piceaperda* and *engelmanni*, *punctatus* and *micans* and *terebrans* and *valens*. In each case the pairs are more or less widely separated from each other in their geographical distribution, as for example; *micans* of northern Europe and *punctatus* of the Appalachians of North American; *frontalis* of the southern states and *arizonicus* of Arizona; *barberi* of Arizona and New Mexico and *brevicornis* of the Pacific slope states, Idaho, Montana and part of Wyoming; *ponderosæ* of the central and southern Rocky Mountains and *monticolæ* of the northern Rocky Mountains and Pacific Slope.

There are a large number of similar cases of so-called paired species in other genera and the supposition that some of them are one and the same species has led to considerable confusion relating to the true range of a species. Between North America and Europe we have several examples such as *Xyleborus pyri* of America and *Xyleborus dispar* of Europe, *Dryocœtes autographus* of Europe and

Dryocætes septentrionis of the western coast and Alaska of America, *Xyloterus lineatus* of Europe and *Xyloterus bivittatus* of eastern and western North America, *Hylurgops glabratus* of Europe and *Hylurgops pinifex* of eastern America. There are many others common to two or more countries which superficially seem to be the same things and if so would come under the head of discontinuous distribution of species.

Some of the most important examples in discontinuous distribution of species are to be found in a leading article by Professor Kellogg in the American Naturalist for March, 1913, on "Distribution and Species-Forming of Ecto-Parasites." This has reference to the curious and most interesting bird lice on which Professor Kellogg is a special authority. This writer states: "There appears to be a plain tendency for a single parasite species to be common to two or more related host species even though these hosts be so widely separated geographically and so restricted to their separate geographical range that all possible chance of contact between individuals of the different host species seems positively precluded."

Numbers of examples are given. Professor Kellogg thinks that this remarkable discontinuous distribution is due to descent from a widely distributed common ancestor.

Many interesting examples of discontinuous biological islands characterized by the same or very similar species, are to be found in high, isolated mountains or mountain ranges, and low bogy areas, and so-called ice caves, regular caves, etc. Some of the boreal islands are restricted to a few square rods. Whenever in these islands the climatic conditions and the general environments are similar the same or similar genera and species of plants and animals occur, which in many cases are separated by hundreds or even thousands of miles from the nearest area of continuous distribution.

Some of the causes of discontinuous distribution may have been due to the separation of once continuous land masses, fluctuating climatic conditions of circumpolar areas from similar conditions throughout to radical local differences due to glaciation and ocean currents. There are also a great many examples of artificial or accidental introductions, but I am more and more inclined to the opinion that parallel evolution from a common primitive ancestral base under long continued, similar environments has been a very important factor in establishing what are considered to be the same species, and closely allied species in widely separated areas of the world. Therefore it seems to me that we have in this principle of parallel modification and evolution a simple and plausible explanation for many of the puzzling features in the geographic distribution of genera and species of plants and animals.

——In discussing this paper Mr. Caudell spoke of the Mantid genus *Brunneria*. This genus was described by Saussure in 1869 from a species from Argentina and within the next two years he added two more species, both from Brazil. A quarter of a century later Mr. Scudder described *B. borealis* from Texas in the United States. Representatives of this genus have never been found in the intervening countries of Mexico and Central America, though future collecting may yet show the genus to occur there. The northern species, five speciments of which are in the National Museum Collection, have been compared directly with the type species from South America and appear to be perfectly congeneric with it.

Accidental introduction was cited as a potent factor in discontinuous geographical distribution. It was suggested that had the recently introduced Asiatic mantis, *Tenodera sinensis*, been brought over by some early explorer it might have become well distributed over our northeastern states and have been described by some early American entomologist as a new species, its relationship to the Old World form not being suspected. Indeed, in a case like this, were the known New World four thousand or more years old instead of four hundred, the species would very likely have been changed by climate and environment into a distinct variety or species or even genus.

——In reply to Mr. Caudell, Mr. Banks said it made no difference whether these genera were used in the present sense or divided; the fact would still remain that one genus or several allied genera had a certain distribution. He also said that though there were many insects distributed by commerce, the distribution of the genera he had considered was effected long before the existence of man.

Meeting of May 1, 1913.

The 268th regular meeting of the Society was entertained by Mr. W. D. Hunter in the Sængerbund Hall, 314 C street N.W., on the evening of May 1, 1913. In the absence of the Recording Secretary the President asked Mr. Rohwer to read and record the minutes. There were present Messrs. Baker, Banks, Barber, Böving, Burke, Busck, Caudell, Cory, Craighead, Cushman, Duckett, Fisher,

Gahan, Gill, Greene, Heidemann, Heindrich, Hood, Hopkins, Hunter, Kirk, Knab, McIndoo, Malloch, Middleton, Myers, Pierce, Popenoe, Rohwer, Schwarz, Shannon, Snyder, Turner, Walton and Wood, members, and T. D. A. Cockerell and W. T. N. Forbes visitors. President Busck occupied the chair.

The minutes of the preceding meeting were read, and with the insertion of the names of Dr. Adam Böving and Mr. H. B. Kirk as having been proposed for active membership at the last meeting were approved.

The Corresponding Secretary read a letter from Dr. David Sharp thanking the Society for electing him as an honorary member.

The Editor stated that the manuscript for the second number of volume XV was in the hands of the printer and that it was intended that it would be out on June 6. He also added that he had attended the meeting of the Editors and Secretaries of the Washington Academy of Science and affiliated societies, the purpose of which was to obtain suggestions as to the improvement of the Journal of the Academy. It had been suggested that a department of news and personal notices be included. No action was taken on this.

Dr. Adam Böving and Mr. H. B. Kirk were elected active members.

The first paper of the evening "Remarks on Fossil Insects" was presented by Professor T. D. A. Cockerell.

REMARKS ON FOSSIL INSECTS.

By Prof. T. D. A. Cockerell.

[Author's Abstract.]

The known insects, as well as the plants, can be divided into two great groups, the ancient and the modern. The ancient groups were represented in the Palæozoic and earlier part of the Mesozoic. During the Mesozoic the dicotyledonous plants, even including genera still common, appeared, and the flora has not changed its general facies since. We know very little about the later Mesozoic insects but the Tertiary insects are so thoroughly modern in type that there is no doubt that the modern series of insects arose during the Mesozoic. At the same time, it must be noted that of the groups prevalent today, some are very much older than others. The statement has been carelessly made, that bees existed during the Mesozoic. As a matter of fact, none of the few known Mesozoic

Hymenoptera are bees, or at all nearly related to them. It is possible that there were Mesozoic bees, but if so, they have still to be found. In the upper Cretaceous of Colorado, the speaker had found fairly large pieces of amber, but careful search in it has not produced any plant or insect remains. Insect-bearing amber from the Cretaceous would of course be of extraordinary value, and might be expected to throw light on many entomological problems. In this country there are extensive insect bearing beds of Eocene age in Wyoming, and especially in the region about the boundary between Colorado and Utah. Mr. Earl Douglass, who has recently come from that region, stated to the speaker that the insect bearing deposits he had examined were extremely rich, but nearly all of the insects were small. It is hoped to visit these deposits at some future time, and as they are much older than either the Prussian amber or the Florissant shales, it is expected that very interesting materials may be found.

The species from Eocene horizons described by Scudder, though quite numerous, must represent only a small part of the fauna which has been preserved.

The Prussian amber insects are extremely numerous, and many of them so beautifully preserved that it is possible to count the palpal joints, and see many other details of structure. They have about 100,000 specimens in the collection at Königsberg. The speaker, some years ago, described the bees of the Königsberg collection, and found that all the genera were extinct, while some of the other Hymenoptera, as for instance, two species of *Crabro*, belonged strictly to living genera. The amber insects, after being much neglected, are now being carefully worked up, and attention must especially be called to Ulmer's magnificent monograph of amber Trichoptera. Dr. W. M. Wheeler has just completed the study of the amber ants, and his paper will be of the greatest interest, showing a curious mixture of quite modern Palæarctic types, with many remarkable genera of Indo-Malay affinities.

The Florissant beds, in which the speaker has principally worked, are of Miocene, probably Upper Miocene, age. The species known from there now considerably exceed a thousand, and it becomes possible to draw some conclusions from the absence as well as the presence of certain groups. It is very singular that no true Muscidæ and no Tachinidæ have ever been found; while on the other hand Nemestrinidæ were well represented, and there were two species of tse-tse fly, *Glossina*. The Bombyliidæ and Aphididæ seem, though numerous, all to belong to extinct genera but in some other families, equally common, all or nearly all the genera appear to be still living. It has appeared not necessary, for example, to propose a new generic name or any one of the Asilidæ. Tipulidæ

are very abundant and the modern genus *Tipula* is very rich in species. No recognizable Culicidæ have been seen, except a single egg which certainly appears to belong to this group. Among the bees, some of the genera are extinct, but most are still represented in Colorado in marked contrast with the bee fauna of amber which is considered to be much older. Some of the wasps greatly resemble living species, and the same is true of the sawflies. There are however some remarkable extinct types of sawflies. The sawfly fauna as a whole is found by Mr. Rohwer to resemble that of the eastern United States, herein agreeing with the flora, which has much in common with that of the uplands of the southeastern states. Thousands of specimens of ants have been collected, but they have not been described. They are in the hands of Dr. W. M. Wheeler. The beetles are being worked up by Prof. H. F. Wickham, who visited Florissant last year and made a large collection. Weevils are extraordinarily abundant, and include some very curious extinct generic types. Certain families are unaccountably absent or at least have not been found; perhaps the most noteworthy being the Histeridae, which would be readily recognizable. It at first seemed that small beetles were scarce, but Professor Wickham has gone over a quantity of the best shale with a lens, and has discovered a number of minute things which would be overlooked in the field. Perhaps the most interesting discovery among the Coleoptera is a genus with two species, apparently referable to the Paussidæ. On the whole it seems that the Florissant shales were laid down at a time when Bering Strait was dry land, and the old world fauna was invading North America; but the Isthmus of Panama was still under water, so that there is no clear indication of any strictly neotropical fauna or flora in the shales.

The Miocene beds at Œningen, or rather Wangen, in Baden, appear to be approximately of the same age as those of Florissant, and carry a very similar fauna. These beds were visited by the speaker some years ago, and while some good plants, molluscs and fish were collected, it was found impossible to get at the good insect-bearing beds, which are covered with earth and rock on which vegetation is growing. The fossils were obtained when the rock was quarried, and the quarries have been neglected for about thirty years. It is evident that there are vast beds of fossils at Wangen still untouched, just as there are at Florissant and it is surprising that no one has taken enough interest to continue the work of Heer. It would not cost any very great sum to open up the beds and collect more fossils, especially since labor is cheaper than in Colorado, and more easily obtained. The locality is a charming one overlooking the north bank of the Rhine. Heer's Œningen fossils are mostly in the Museum of the University in Zürich where the speaker examined them.

Many of them are very beautiful. Numerous fossils from the same locality were seen in the Museum at Constance.

From the Miocene to the Pleistocene, we know little of the American insect fauna; but the interglacial clays have yielded a number of Coleoptera, which Scudder has described, finding them distinct from, but closely allied to, living species. As the Pleistocene plants are known to be mostly living species, it appears from this that the species of insects change more rapidly than those of flowering plants; but generic changes among insects appear to be very slow. Most of the multitudinous species of insects which perplex entomologists may be said to be due to a sort of shuffling of the characters which have been inherent in their several generic types for a very long while.

——In discussion of Professor Cockerell's paper Dr. Gill objected to the liberal use of the word cockroach and added that he had argued this point with the late Dr. S. H. Scudder. His objection to Professor Cockerell's use of the term was that the ancient insects called cockroaches were not the cockroaches of today; they do not belong to the family Blattidæ or even to the same order as the modern cockroaches which did not appear until the Upper Cretaceous. Dr. Gill added that he had made the same objection to the common liberal use of the word "horse" as applied to the ancestors of the horse, stating that the three-toed horse was not a horse or even closely related to the modern *Equus*—indeed it belonged to an entirely different group.

Dr. Gill added that among most animals there was a great difference between the ancient types represented in the Palæozoic formation and those which come in the Cretaceous and newer rocks. So marked is the difference that for mammals the modern fauna has no family in common with the Eocene except possibly the Didelphidids. The difference is not so well marked in the molluscs as they have come through with but little change since the Cretaceous, and even earlier, for there are several freshwater types, as viviparids, melaniids, unionids, in the Jurassic beds which on the characters available can hardly be distinguished from forms living today. The mammals are entirely different and have evolved very rapidly, the fish less rapidly, and the molluscs more slowly, so these great goups may serve as chronometers for the including rocks.

——In further comment on Professor Cockerell's paper Mr. Banks emphasized the importance of the amber insects and stated that some of them which he had seen were in even better condition than the modern museum specimens, referring mostly to the Psocids. As an example of the fragmentary and unsatisfactory nature of most Florissant fossils he commented on the recent description of a Phryganeid by Professor Cockerell and stated that this family could only be separated from the closely allied Limnophilidæ by the male palpi, which were not preserved. He also commented on the value of the recent work on amber Trichoptera by Ulmer.

Mr. Banks added that in the fossil fauna of Florissant are groups of insects which occur today only in warm countries, and also groups which occur today only in cold countries. And he considered that it is possible that in Miocene times one or the other of these groups were accustomed to either a warmer or a cooler climate. For example, if we collected 5500 species of insects around Washington we would undoubtedly have some insects which belonged more properly to the tropical or subtropical regions, viz., the wheel bug. To him the most discouraging thing about fossils is that the story breaks off just at the most important place and that if some could be discovered which would bridge the gap between the Palæozoic and Mesozoic some interesting points might be obtained, for it was during this long period that most of the orders had their beginning.

——Dr. Hopkins stated that he was much interested in Professor Cockerell's remarks about the insects in Florissant deposits and those of the interglacial clays. He added that he examined Scudder's types of Florissant Scolytidae and found that they were not all Scolytids but that those which could be recognized as belonging to this family appeared to belong to modern genera. He stated that one species referred to by him in Psyche[1] under *Hylesinus* had double eyes, but later he found that it belonged to another genus not represented in America but with its nearest ally in the Philippine Islands. He mentioned that he had examined Dr. Scudder's famous fossil stick from the interglacial clays and that from the gallery he had recognized the work of a *Phlœosinus* and suggested that it was allied to a Pacific Coast species, and that Scudder

[1] A. D. Hopkins. American Fossil Coleoptera Referred to the Scolytidæ. Psyche, vol. 9, 1903, p. 64.

had arrived at the same conclusions in regard to many of the other Coleoptera from the same clays.[1]

Dr. Hopkins remarked that, in his opinion, it is not safe to draw conclusions on any evidences of evolution from fossil forms, stating that he believed that as a rule only the highly specialized species were preserved and that the small and less specialized forms from which present species may have evolved, were not preserved. He added that he was glad to have the additional evidence on parallel evolution brought out by Professor Cockerell in his reference to the resemblance of Florissant forms to those of other countries and continents.

The second paper, "Efficiency of a Tachinid Parasite, on the Last Instar of Laphygma" was read by Mr. Walton.

EFFICIENCY OF A TACHINID PARASITE ON THE LAST INSTAR OF LAPHYGMA.

By W. R. Walton, *Bureau of Entomology.*

During the latter part of August, 1912, an infestation of *Laphygma frugiperda* occurred on the grounds of the Department of Agriculture at Washington, D. C., in close proximity to the quarters occupied by the Bureau of Entomology. Observations indicated that the larvæ were parasitized in a high degree by Tachinid flies. The occasion was therefore grasped as an opportunity for securing data on the relative efficiency of these parasites in the last instar of the caterpillar. It has been remarked by various observers that caterpillars frequently cast off the eggs of Tachinids with the pellicle during ecdysis, before they have hatched or at least before the young larvae have been able to gain entrance through body walls of their host. But as the last instar of some caterpillars is of longer duration than the earlier moults, and as in this stage the larvæ are, on account of their larger size, method of feeding, etc., more open to the attack of Tachinidæ, it seemed possible that oviposition might prove more effective in this instar than in the earlier moults.

Accordingly efforts were made to secure information on the following points: (1) Effectiveness of parasitism; (2) maximum number of adult Tachinids to issue from one individual of host; (3) what effect if any had the deposition of supernumerary eggs on

[1] A. D. Hopkins. Contributions to Canadian Palæontology, vol. II, pt. II. Canadian Fossil Insects. Appendix: Work of the prehistoric Scolytid, *Phlœosinus squalidens* Scudd. pp. 91–92., plate XIV.; XV.

the development of the resulting adult flies; (4) what species of Tachinidæ were involved.

The only species reared was *Winthemia quadripustulata* Fabr. Fourteen caterpillars were selected, each bearing from one to twelve of the conspicuous eggs of this fly. Each larva was placed in a single small cage and kept under similar conditions. Two of them designated respectively as F and G died after entering the ground from causes undetermined, no flies issued from them, they may therefore be eliminated from consideration. In the remaining twelve cases parasites emerged from each, resulting in the destruction of the host, thus apparently indicating a very high degree of effectiveness for this species of parasite on the last instar of *Laphygma*.

The largest number of flies to issue from any one host was three and this occurred only in one instance. In five cases two flies emerged. In the remaining six but one fly each resulted. It may be seen by consulting the appended table that the largest individuals each and all emerged from hosts which had borne but a single egg of the parasite. In these cases designated as A, G and L the flies averaged 10.5 mm., all males. In case M (the only example remaining in which but two eggs were borne by the host), the resulting fly, a female, measured 9 mm., indicating apparently that there is a distinct economic loss to the fly when more than one egg is deposited. And this idea is well borne out by the results obtained from the other examples where a large number of parasitic eggs were found. In cases C and D where six eggs occurred the resulting flies, two males and one female, averaged 8.5 mm. In cases I and N where 7 eggs occurred we have an average of 8.50 (two males and one female). In cases E and K where as many as 12 eggs were present on the host the average is but 7 mm. (three males and one female). In both the latter cases but two adults issued in each cage. It appears obvious from the foregoing that in this species at least the size of the adult fly may bear a direct relation to the number of eggs deposited on the host caterpillar by the parent. It would be interesting to know what effect if any this diminishment in size has upon the reproductive powers of the resulting individuals. The three largest individuals are all males. But the fact that size bears no relation to sex in this species is apparent from the results here obtained, that is to say, the two smallest individuals reared (see case K) are also males.

We might speculate at length upon what occurs in those caterpillars where several eggs are deposited. But one thing is plainly evident, namely, that a struggle for survival ensues among the parasites. One result of which is diminished size and therefore possibly a lessening of reproductive vigor in the issuing adults.

Some time subsequent to the preparation of this manuscript it was my privilege to see Dr. J. C. Nielson's most interesting paper[1] relative to his experiments with *Tachina larvarum* Linn. (a species very closely related to, if not identical with, our *Tachina mella* Walk.) and its parasitism on *Zygaena filipendulae* in Denmark. My experiments while conducted on a much smaller scale seem to indicate results which are in the main parallel with his. That is to say, the deposition of supernumerary eggs resulted in a diminution of size in the resulting parasites. However, he says, "in cases where several flies emerged from the same host; their size was not equally reduced, one or two of them not differing in size from that of flies which had developed solitary, the remainder being undersized." He does not, however, state whether the solitary specimens mentioned were those resulting from the deposition of one, or more than one egg on the host caterpillar.

The detailed results of my somewhat limited investigation are summarized below in the appended table:

Cage Symbol.	No. of eggs on caterpillar.	Entered earth.	Date parasites issued.	No. of flies issued.	Length mm.	Sex.	Remarks.
A.....	1	Aug. 28	Sept. 12	1	11	♂	
B.....	4	Aug. 30	Sept. 12–14	3	8–7–7	♂ ♀ ♀	
C.....	6	Aug. 30	Sept. 12	2	8–9	♂ ♂	
D.....	6	Aug. 30	Sept. 14	1	8	♀	
E.....	12	Aug. 30	Sept. 11–14	2	8–8	♂ ♀	
F......	9	Aug. 30	0	0	—	—	Died in earth.
G......	2	Aug. 30	0	0	—	—	Died in earth.
H.....	9	Aug. 30	Sept. 12–14	2	7–7	♂ ♀	
I......	7	Aug. 30	Sept. 11	1	9	♂	
J.......	1	Aug. 30	Sept. 14	1	10	♂	
K......	12	Sept. 1	Sept. 12	2	6–6	♂ ♂	
L......	1	Aug. 30	Sept. 12	1	10	♂	
M......	2	Aug. 30	Sept. 15	1	9	♀	
N......	7	Aug. 30	Sept. 12–14	2	8	♂ ♀	

——In discussing this paper Mr. Pierce stated that in the South he had found *Chelonus texanus* Cresson (det. Viereck) which laid its egg in the egg of *Laphygma* to be a much more efficient parasite

[1] Undersogelser over entoparasitiske Muscide larver hos Arthropoder af Dr. J. C. Nielson, Saertryk af Vidensk. Medd. fra den naturh. Foren. Bd. 64 p. 215–248.

than the Tachinid mentioned by Mr. Walton, stating that *Chelonus* caused a total mortality and emerged from the third or fourth instar of *Laphygma* larvæ.

——Mr. Busck asked Mr. Walton if he had been able to find any remains of the Tachinid larvæ in the *Laphygma* larvæ on which more than one egg was laid, and whether it had been ascertained if the Tachinid parasite was crowded out in the larval or egg stage.

Mr. Walton said that he had no evidence.

The third paper, "The Ovipositor of *Parandra brunnea* Fabr." was read by Mr Snyder.

THE OVIPOSITOR OF PARANDRA BRUNNEA FAB.

By T. E. Snyder, *Bureau of Entomology.*

The family Spondylidæ is of considerable interest in that there is quite a little doubt as to its proper position in the classification of Coleoptera. Indeed, some authors consider the genera *Parandra* Lat., *Spondylis* Fab. and *Scaphinus* Lec., which LeConte and Horn[1] have placed in a separate family, either as belonging to the family Cerambycidæ or as aberrant Cerambycidæ. LeConte and Horn have divided the family Spondylidæ into the subfamilies Parandrinæ and Spondylinæ the former embracing the genus *Parandra* Lat., the latter the genera *Spondylis* Fab. and *Scaphinus* Lec. As LeConte states,[2] this family "might be regarded as representative of a family nearly extinguished in the lapse of time," for the species are "very few and highly discrepant."[3] Species of the genus *Parandra* Lat., like those of genera of the family Prionidæ have the prothorax margined and as there are many characters to indicate relationship, it has been included in this family by some authors as an aberrant form. The larva of *Parandra brunnea* Fab. is typically Cerambycid-like in form and has characters which, according to Mr. F. C. Craighead of the Bureau of Entomology, place it between the groups *Prionini* and *Asemini*. The larva of *Spondylis buprestoides* Linn.,[4] a European species, according to Judeich and Nitsche, is similar to Cerambycid larvæ in form. The

[1] Classification of the Coleoptera of North America, Washington, 1883, p. 264.

[2] Journ. Ac. Nat. Sci., 2nd Ser., vol. II, 1851, p. 99.

[3] Sharpe, D. "Insects." Pt. II, pp 287–8, "The Cambridge Natural History," vol. VI, 1901.

[4] Lehrbuch der Mitteleuropaeischen Forstinsektenkunde, 2, I, 1889, pp. 570–71.

ovipositor of species of the genus *Parandra* Lat. is unlike the fleshy ovipositor of most of the Cerambycidæ as it is heavily chitinized and highly specialized, being adapted to actually insert the eggs in wood. The ovipositors of species of the genera *Spondylis* Fab. and *Scaphinus* Lec., however, more closely resemble those of the normal Cerambycidæ. The ovipositor of *Parandra brunnea* Fab. (fig. 1) is operated by being extended by the contraction of the muscular attachment of a chitinous rod and an invagination, sternite VIII. The 8th abdominal tergite overlaps the 7th and the rod and sheath is attached by muscles to the 7th tergite and the 8th sternite. The function of the ovispositor, which terminates in

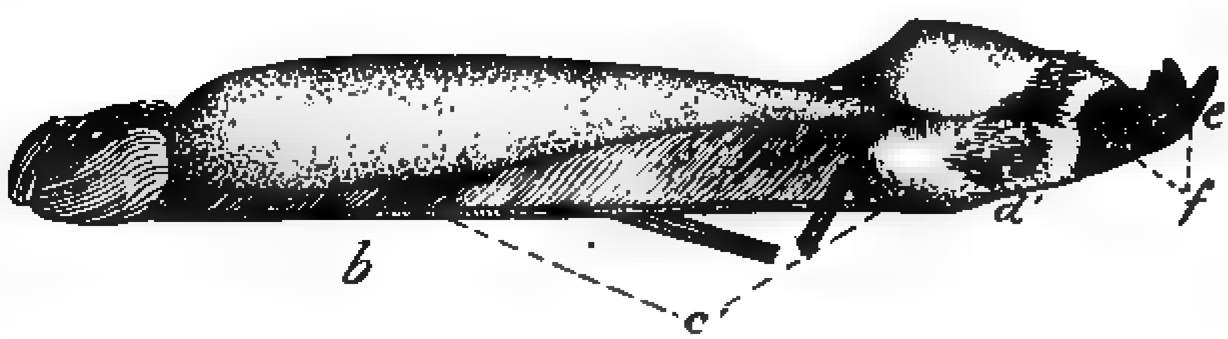


Fig. 1. Ovipositor of *Parandra brunnea* Fabr.; a, ventral view; b, lateral view of same, showing c, c′ rod; d, d′ invagination; e, e′ prongs; f, foveæ.

three pair of up-pointing prongs or teeth, the inner pairs or molars of which are movable, is probably to drill or rasp out a pocket for the egg. The muscles at the base of the ovipositor enable it to be twisted about. The ovipositor of *Prionus laticollis* Drury (fig. 2) is also chitinized and is a modification of the normal fleshy ovipositor of Cerambycids.

The nomenclature is omitted as Dr. Hopkins and Dr. Böving will later correlate the various parts of the ovipositor of *Parandra brunnea* Fab.

The eggs of *Parandra brunnea* Fab. are inserted in decaying wood or even in moist wood where there is only incipient decay. A chestnut telegraph pole in which eggs were found was set in the

ground near Anacostia, D. C , and had been standing but little over a year. A number of the eggs are inserted proximately, often in the

Fig. 2. Ovipositor of *Prionus laticollis* Drury, ventral view c, c' *cerci*.

pores which are rich in food substances. The larvæ upon hatching excavate shallow longitudinal burrows, then enter he wood transversely. This habit of living in wood below the surface of the ground is shared with species of the Prionidæ and doubtless the earth about the wood serves the purpose of retaining moisture as does the bark upon logs under which many beetles insert their eggs.

The drawings are by C. T. Greene.

The following papers were accepted for publication:

A NEW SPECIES OF SIMULIUM FROM TEXAS.

By J. R. Malloch.

Simulium distinctum, new species.

Male: Black. Antennæ yellow, generally more or less brown toward apices; face with silvery pollinosity; palpi and proboscis black, or brown. Mesonotum deep velvety black, with two silvery pollinose, slightly curved lines, which are broadest at anterior extremities, and extend the whole length of disk, meeting at the posterior margin with a cross band of the same color; side margin yellowish, with silvery pollinosity, prescutum yellow; pleuræ opaque gray, yellowish below wing base on the membranous portion of mesopleura; scutellum black; post-notum black with a silky lustre. Abdomen with basal scale velvety black or brown-black, the segment below it yellow, the succeeding three segments deep velvety black; next segment sometimes more or less yellowish, and almost entirely covered with silvery pollinosity, which is also noticeable on sides of next segment; apical segments and hypopygium black. Legs yellow; fore coxæ slightly, mid and hind coxæ distinctly grayish; hind femora with apical half blackened; fore tibiæ darkened towards apices and, like the other tibiæ, whitish on dorsal surfaces; hind tibiæ with apical half black; fore tarsi black; mid and hind tarsi with apices of first and second, and whole of third to fifth joints black. Wings clear. Halteres yellow.

Head normal in shape, the upper eye facets much larger than the lower; face with a few black hairs. Mesonotum with golden pilosity, which is

not very pronounced, and only visible, under a moderate magnification, on the pale stripes, though more conspicuous on posterior and lateral margins; scutellum with decumbent golden pilosity and upright yellowish hairs; pleuræ bare except for the usual tuft below wing base, which is not conspicuous, and confined to upper angle. Basal abdominal fringe yellow, other abdominal segments weakly haired. Legs strong; surfaces with golden pile, and scattered black hairs, which are most conspicuous on dorsal surfaces; fore tarsi slender; basal joint more than twice as long as second; the paired apical hairs present on joints 1 and 3, but not conspicuous; hind metatarsus not as broad as hind tibia, and distinctly longer than the other four tarsal joints together; claws trifid, wing venation normal.

Length, 1.5 mm.

Type: Cat. no. 15958, U. S. N. M.

Locality: Devils River, Texas, May 5, 1907, at light, (Bishopp and Pratt)

Female: In color very similar to the male, but the yellow is more predominant. The frons and face are thickly covered with a pale lavender-gray pollinosity; the antennæ are slightly darkened at base; and the palpi are black. Mesonotum with the appearance of having three deep black stripes on a brownish-yellow ground, the intervening spaces covered with thick pollinosity similar to that on frons, and the lateral margins also distinctly pollinose; pleuræ black, anteriorly and posteriorly yellow-brown, with silvery pollinosity; scutellum brown, gray pollinose, post-notum black, with silky lustre. Abdomen with basal scale yellow; segment below scale silvery, on apex, laterally; the other segments yellow, more or less obscured with brown, and with three rows of black spots. Legs colored as male. Wings similar to male. Halteres yellow. Frons convergent anteriorly, at upper angles almost twice as wide as at lower; surface hairs sparse, pale; face distinctly longer than broad, its breadth slightly more than equal to breadth of frons at lower margin, haired as frons. Mesonotum with the pilosity very short, close and hairlike, yellow in color; scutellum with distinct, decumbent yellow pilosity and longer upright yellow hair. Basal fringe of abdomen short, yellow. Legs haired as in male; claws simple.

Length, 2 mm.

Same data as males. One specimen.

Another specimen with label, Victoria, Tam., Mexico, December 10, (F. C. Bishopp), though smaller agrees in other particulars with the allotype. I do not know of any recorded occurrence of *Simulium* at light, and it seems strange that species which normally prefer the sunshine should be attracted in this manner.

TWO NEW SPECIES OF BORBORIDÆ FROM TEXAS.

BY J. R. MALLOCH.

Leptocera (= Limosina) mitchelli, new species.

Male: Black, shining, but not glossy. Third joint of antennæ, face, and cheeks more or less distinctly reddish brown. Legs brownish. Wings smoky; veins brown. Halteres brownish yellow.

Frons about as long as broad, opaque except on orbits; 3 outwardly directed, orbital bristles present; the center rows consist of 4 bristles each which are of about equal length; antennæ normal in size and shape; arista nearly bare, in length about 1¾ the width of frons; cheek about equal in height to the width of third antennal joint; vibrissa strong, situated slightly above mouth margin; posterior to the vibrissa there is a short bristle situated about midway from lower margin to eye margin, and the usual marginal bristles are distinct; face concave; eyes elongate oval. Mesonotum with only one pair of prescutellar, dorso-central bristles, and the disk thickly covered with short setulæ; pleuræ glossy; sterno-plura with two bristles neither of which is exceptionally long; scutellum with four marginal brisles and the disk covered with short setulæ. Abdomen with numerous surface hairs; hypopygium large, its surface covered with short hairs. Legs covered with short hairs; mid tibia with four to five bristles on the dorsal surfaces, the pair at about apical third strongest, and one ventral bristle at below middle; basal joint of hind tarsus barely longer than broad; second distinctly longer than broad. Wings with first costal division two-thirds as long as second; second subequal with third, or slightly shorter; basal section of third vein not half as long as last section of second; outer cross vein upright, at slightly more than its own length from inner; last section of third vein straight, ending before wing tip; costa extending well beyond end of third vein; fourth and fifth veins indistinct from outer cross vein.

Length, 1 mm.

Type and *paratypes:* Cat.. no. 15972. U. S. N. M.

Locality: Victoria, Texas. 10–9–1907. (September?) (J. D. Mitchell) "on *Bumelia lanuginosa.*" Five specimens.

Allied to *ferruginata* Stenh., which is cosmopolitan in its occurrence, and is common in North America.

Leptocera (= Limosina) approximata, new species.

Male: Black-brown, subopaque. Second antennal joint, viewed from above and the side, velvety opaque black; cheeks and face yellowish-brown. Pleuræ and legs yellow-brown. Halteres yellow, knob brown. Wings clear.

Frons occupying almost the entire width of head, fig. 2, center stripe shining, the narrow stripe on either side opaque orbits shining, lateral margins of center stripe with a row of hairs, orbits covered with short

hairs, the bristles hair-like, and confined to the upper half; antennæ of moderate size, directed outward, second joint with short apical bristles, third joint with pale pilosity; arista slightly longer than width of frons, hair-like, pubescence distinct, white; face slightly retreating in profile, eye small occupying less than one-half the length of head from vertex to anterior margin, distinctly higher than long and in height equal to height of cheek; 2–3 short bristles below anterior lower margin of eye; the marginal bristles on cheek regular, distinct, and increasing in length anteriorly.

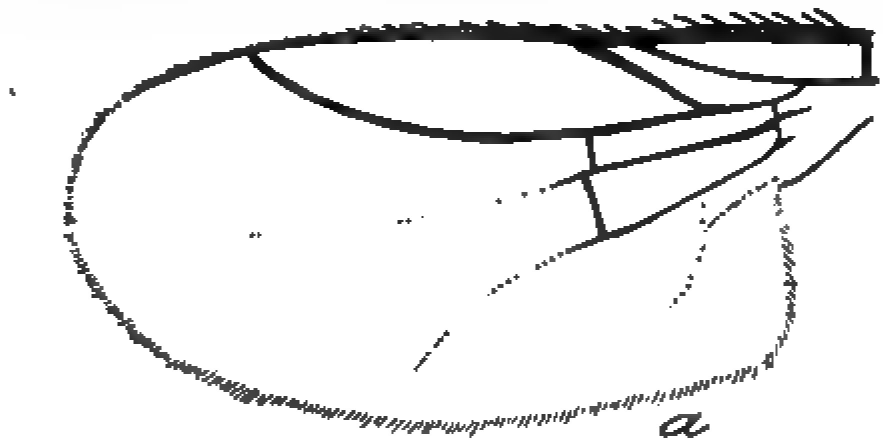


Fig. 1. *Leptocera approximata*, n. sp.; a, wing; b, head, antennae, face and cheeks.

Mesonotum with short discal pale hairs, the bristles confined to a row (5–6) in front of scutellum; marginal bristles weak; scutellum flattened on disk, broad, rounded in outline, disk bare, margin with four widely separated bristles of equal length. Abdomen not longer than thorax; hypopygium knob-like, the surface covered with short hairs. Legs normal; dorsal surface of mid tibia with 4–5 bristles as in most species of *Limosina*. Wing as figure 1a.

Length, 5 mm.

Type: Cat. no. 15973. U. S. N. M.

Locality: Dallas, Texas. August 30, 1907, reared from cow manure, (F. C. Pratt), Hunter no. 1611–19.

The peculiar frons should readily separate this species from any of the few species that are allied to it in wing venation.

NEW EXOTIC NEUROPTEROID INSECTS.

By Nathan Banks, *Bureau of Entomology.*

Included below are a few miscellaneous descriptions of new exotic Neuropteroid insects which I have prepared from time to time while going over parts of my collection.

EPHEMERIDÆ.

Ephemera vedana n. sp.

Yellowish; pronotum with a dark stripe each side reaching back to above base of wings. On dorsum of abdomen, each segment has a pair of dark lines each side, the upper one the wider, except on the penultimate segment where there is one stripe each side, and a submedian pair within, this submedian pair of lines is often indicated on the other segments; last segment has a round black spot each side at base, and on some of the basal segments is a median dark spot. Venter with dark line each side, and the connection of venter and dorsum dark; setæ yellowish, their joinings dark; two dark dots each side on the upper plura. Tibia I dark at ends, femur reddish; basal joint of antennæ dark.

Fore wings hyaline, with a reddish tint along front, deepest in submarginal area and in the pterostigmatic area; cross-veins dark, longitudinal veins pale yellowish; hind wings with the cross-venation also dark; no spots on the wings. In several specimens the intercalary in front of the first anal is united to the anal near base.

The subimago has cloudy wings with dark cross-veins, in some specimens a black dot in the base of the median fork.

Expanse, 22 mm.

From Chapra, Bengal, India, February.

Abdominal marks are similar to those of *E. remensa* Eaton, but there is no trace of spots on the wings and the costal marks are different from that species.

Cloeon pulchella n. sp.

Female: Pale yellowish, abdomen rather darker. Wings hyaline, the costa faintly yellowish; about 25 cross-veins in the wings, and several of these are continuous across longitudinal veins, none near the margin, two or three in the pterostigma, widely separated, none before bulla; two intercalaries behind median, cubitus, and first anal, the posterior one of those behind median and cubitus is the longer.

Male: Thorax brown, basal segment of abdomen brown above, segments two

and three are pale, marked with brown, four and five white with brown hind margins, sixth white, with large brown spot each side behind, seventh broadly dark behind, eighth, ninth, and tenth wholly dark; venter hyaline, except last two segments dark. Fore femur dark at base, and a broad band at tip, and a dark line at tip of tibia.

Wings hyaline, a red-brown dot on inner end of great cross-vein, otherwise venation is hyaline, and on the same plan as that of the female.

Expanse, 8 mm.

From Chapra, Bengal, India. (Mackenzie).

HEMEROBIIDÆ.

Climacia basalis n. sp.

Body yellowish, head shining, antennae with two basal joints pale, rest black; thorax, legs, and abdomen pale. Wings pale, in base of fore-wing is an elongate curved, dark brown streak extending along radial sector from its origin out to first fork and then up on the upper branch for a short distance; stigma yellowish; gradates dark brown, almost bordered, the basal venation pale, beyond middle veins are dotted with brown, a faint brown cloud along basal anal margin; hind wings with brownish yellow venation, cross-veins darker. In fore wings about eleven costals before stigma, upper branch of radial sector connected three (or two) times to radius, first near base (sometimes lacking) second plainly before the stigma, and again under stigma; upper cubitus ends in five or six branches; the stigma of hind wing plainly swollen out.

Expanse, 8 mm.

From Bartica, British Guiana, December (Parish).

Climacia bimaculata n. sp.

Yellowish; a large black interantennal mark reaching above and below, head shining, three basal joints of antennae pale, rest black; thorax, abdomen and legs pale. Wings yellowish, venation yellow, outer gradates brownish, not very dark; each fore-wing with two large dark brown spots; basal transverse one over first fork of the radial sector and extending narrowly behind, second spot on costal and sub-costal area just before the stigma; stigma yellowish. Hind wings less yellowish, venation pale, a faint brown spot just before stigma. Fore-wings with about ten costal cross-veins before stigma, upper branch of radial sector connected three times to the radius, once near base, once at base of stigma, and under stigma, lower cubitus ends in four or five branches. Ovipositor long, slender, ends in a curved point.

Expanse, 8 mm.

From Bartica, British Guiana, December (Parish).

CHRYSOPIDÆ.

Chrysopa parishi n. sp.

Yellowish; a red mark under each eye, not reaching to mouth, a red mark back of each eye on the vertex and continued back on the anterior part (only) of the pronotum. Wings with very broad costal area, apex hardly acute, gradates black and margined, six in inner series, eight in outer row, inner series irregular, but nearer to radial sector than to the outer series, the marginal forks three times as long as broad, all veins rather stout, many faintly obscured, costals black at ends or almost wholly black, about 20 before stigma, three or four beyond end of the subcosta, radial cross-veins dark at upper end, divisory veinlet ends much beyond the cross-veins, second cubital cell as long as third, base of third oblique; pronotum but little longer than broad, narrowed in front.

Expanse, 29 mm.

From Bartica, British Guiana, December (Parish).

Chrysopa albatala n. sp.

Runs to *C. atala* Br. in Navas table, and very near to it, but differs at once in lacking a dark mark on cheeks and the palpi are marked with black. Antennae pale, basal joint with a dark line on outside; pronotum as broad as long, barely broader behind. Wings rather short, hardly acute at tips, with but few veins, about sixteen costals before stigma, four cross-veins behind stigma; gradates with four inner series and six in outer series, inner series nearer to the outer than to the radial sector; marginal forks about twice as long as broad; divisory vein ends at or a little beyond the cross-vein; third cubital equal to second, latter narrowed at tip and the third at base, more than usual.

Expanse 21 to 23 mm.

From Bartica, British Guiana, December (Parish).

Leucochrysa nigrovaria Walker.

Pale yellowish, a broad dark brown band under base of antennae from eye to eye, the lobe of vertex with a curved dark line in front; palpi unmarked; antennæ pale, first joint with an oblique, rather broad dark brown stripe above, second joint dark brown, next four or five joints infuscated within; margin of pronotum narrowly dark, a black spot on each lateral lobe of the mesothorax, and another near base of the fore wing, metathorax with dark spot above base of hind wings, third and fifth abdominal segments marked with black. Prothorax narrowed in front, a little broader than long. Wings with green venation; origin of radial sector, base of the divisory veinlet, outer gradates, ends of radial cross-veins and a few others dark; in hind wings venation almost wholly green. Stigma in both pairs dark in base. Seven or eight gradates in each series, inner series not nearer outer than to radial sector; marginal forks three times as long as broad; 21 costals before stigma in the fore wing.

Expanse 35 mm.

From Minero, Muzo, Colombia, 500 m. (Fassl.).

Chrysopa bolivari n. sp.

Similar to *C. caucana*. Antennae black, basal joints dull reddish, two dark spots on vertex, a black line from eye to mouth, and palpi marked with black; pronotum with two dark lines each side, one marginal, marginal dark stripe above base of wings on meso- and metathorax, and abdominal segment marked with dark on sides. Wings short, rounded at tip, few-veined, about fourteen costals, four cross-veins behind stigma, three or four gradates in each series, outer as near to inner series as to the margin, marginal forks not twice as long as broad, divisory ends beyond cross vein, second cubital as long as third, but not as wide. In basal part of wing several veins are thickened for a short distance, the radial sector between the first and second cross-veins to the median, the base of divisory cell, extending back on upper part of of second cubital cell, and also the cubital near base; these sections are about three times as broad as the rest of the vein, and furnished with minute spicules; these only in the fore-wing.

Expanse, 20 mm.

From San Antonio, Colombia, January, 2000 m. (Fassl.).

Chrysopa latithorax n. sp.

Greenish; a large, broad-bodied species; no dark marks except red line between antennæ; a whitish median stripe on thorax and abdomen, abdomen not dark on sides. Antennæ rather short and stout; prothorax fully twice as broad as long, much broader behind than in front. Wings rather slender, almost acute, rather densely veined, many costals, 9 to 11 gradates in each series, outer nearer to margin than to inner series; divisory veinlet ends at or barely before the cross-vein; third cubital shorter, but wider than second, its base very oblique; marginal forks about four times as long as broad; about eight cross-veins behind stigma, and three or four beyond end of the subcosta; radial sector dark at origin and out for some distance; most of the cross-veins dark, at least in part, and marginal forkings dark; in all wings there is one or more accessory gradate veinlets.

Expanse, 32 mm.

From Mendoza, Argentine, (Haarup).

Chrysopa confraterna n. sp.

Runs to *C. nobregana* in Navas table, differs by having a dark brown mark under each eye, but not reaching to mouth. Pale yellowish, probably greenish alive; head rather long and narrow; palpi with dark tips; vertex slightly tumid; pronotum broader than long, scarcely broader behind, with a faint mark each side.

Wings moderately slender, not acute at tips, with green venation, slightly darkened on costal and radial cross-veins, and on some other veins; gradates dark, inner of seven, outer of eight veinlets, outer series nearer to margin

than to the inner series; stigma green; divisory ends beyond the cross-vein; third cubital rather longer than the second, and widened at tip; marginal forks hardly twice as long as broad.

Expanse, 22 mm.

From Chacra di Coris, Argentine, 26 February, 20 March.

MYRMELEONIDÆ.

Acanthaclisis subfasciatus n. sp.

Face below antennæ wholly pale yellowish, basal joint of antennæ also pale, a black mark between antennæ, above is a transverse pale band, the vertex dull blackish, with three black joints or a line, all with short white hair; palpi pale. Pronotum yellowish, a median stripe (broader and divided in front), a narrow stripe each side not reaching behind, and the sides (broadly behind), all black; thorax brownish, a black stripe each side above wings; abdomen dull black, with short white hair; thorax with long white hair, and shorter erect black bristles; femora mostly blackish, tibiæ yellowish, the front and middle ones black banded on outside, hind tibiæ with black tip; tarsi black, pale on first and base of fifth joints. Wings hyaline; with about four faint brown bands before stigma, the first one extending over fork of cubitus, these bands are most distinct on radius and cubitus; between the bands the wing is hyaline whitish and most of the venation also; a dark mark at stigma and a spot at union of cubitus and median, and spots all around outer edge, a faint mark at end of anal vein; the subcosta has short dark spots, and the radius long dark spaces, many cross-veins are black, and the line of bent veins also black. In hind-wings is a mark at stigma, and faint clouds along outer posterior margin and a faint mark over cubital fork. Wings moderately slender, about as in *A. conspurcatus*. In fore-wings about seventeen to twenty-four costals are simple, and about as many crossed; in hind-wings no costals crossed; in fore-wing seven cross-veins before radial sector, in hind-wings four such cross-veins, twelve branches to radial sector in each wing.

Expanse, 80 mm.

From Kuranda, Cairns, Queensland, Australia. (Dodd).

All the other described Australian species of this genus have the costals crossed to near base of wing, only six or eight being simple.

The *A. fulva* Petersen resembles a species in British Museum (and my collection) which bears a manuscript name of van der Weele's. This species however has narrow wings, all veins (or nearly all) are red-brown, the mesoscutellum has two yellow dots, and hind wings have a cloud along outer hind margin. It comes from West Australia. I would name it but the type should be in the British Museum.

Acanthaclisis subtendens Walk. appears to be a small specimen of *A. fundatus*, at least the venation is about the same.

Formicaleon brahmanicus n. sp.

Head pale yellowish, a dark line under each antenna, and a spot above each, a bicurved line across in front of the vertex and a T-shaped mark on each side, and two little spots behind; antennae brownish, annulate with darker brown, palpi pale; pronotum pale, but not clear, a dark stripe along each outer margin from the transverse groove backward, and within is another lateral stripe each side slightly approximating behind; thorax pale, with many dark marks, one round each corner of the middle lobe, large geminate spot above each fore-wing, a streak reaching backward, leaving a very broad pale median area; pleura pale; abdomen pale, with a brown stripe each side, twice indented from above on each segment, segments three and four with a median and an apical spot (latter may be united to the side-stripes), fifth and following segments with the side-stripe broad and connected broadly at tip of segments; last few segments of venter dark; legs pale yellowish, with some black dots at base of the black bristles; mid and apical dark bands on tibiae I and II, tips of tarsal joints one to four black and a preapical band on last joint, this joint being nearly as long as all others together; spurs not much curved and as long as four segments, legs not very slender, femora thickened. Wings hyaline, longitudinal veins interrupted with dark spots, very faint on median vein, cross-veins often dark at ends; stigma very faint, a dark dot on the radius below stigma and one out near tip of wing, a spot between median and cubitus near their ends and one on cubital fork near margin; hind wings with many forks and veins in outer posterior part of wing embrowned, so as to form a dark streak subparallel to the outer fourth of the hind margin. Hind-wings longer than forewings, and a little more slender and very acute at tip, fore-wings also slender, and with acute tips, seven cross-veins in fore-wings before radius, eleven or twelve branches of radial sector, in fore-wings seven cross-veins between a cubital fork and anal, in hind-wing anal ends only a little beyond cubital fork, in fore-wings the vein up from end of anal soon runs back to the margin.

Expanse, 86 mm.

From Pusa, Bengal, 3 to 11 March, 17 June.

TRICHOPTERA.

Dinarthrodes niger n. sp.

Black, with rather reddish brown hair, legs brownish; antennæ with tips and base on outer side of joints white, leaving a triangular black portion on each joint; maxillary palpi erect, densely haired, the broad joint masking the face; basal joint of male antenna fully twice as long as vertex, very large, slightly concave beneath, above with two large erect processes; the basal one not as high as the other, concave within and from upper inner angle is a long slender process reaching over to the opposite antenna; second process rather beyond the middle, subconical. Legs slender, not densely haired, spurs, 2, 4-4. Fore-wings rather slender, apex roundedly truncate, forks

Rhigopsidius tucumanus HELLER, DORSAL VIEW, GREATLY ENLARGED.

1, 2, and 5, discal cell nearly as long as pedicel. Ventral male appendage long, upcurved, with a slender apical piece, pale and bare.

Expanse, 19 mm.

From Batavia, Java.

PRELIMINARY REPORT OF THE FINDING OF A NEW WEEVIL ENEMY OF THE POTATO TUBER.

By E. R. Sasscer and W. Dwight Pierce, *Bureau of Entomology.*

On May 21 of the current year, a number of potato tubers (*Solanum tuberosum*) from the neighborhood of Huarochiri, Peru, were received by Mr. F. V. Coville and were inspected by one of the authors (E. R. S.) and Mr. H. L. Sanford in accordance with the regulations governing importation of nursery stock by the United States Department of Agriculture. This examination revealed the presence of weevil mines and also those of the potato-tuber moth (*Phthorimœa operculella* Zell.?).[1]

Material infested with larvae, pupae and adults, and collected by Mr. W. F. Wight for horticultural purposes was received from the following localities on May 24: Cuzco, Temuco, and Arequipa, Peru; Oruro, Bolivia; and Ancud or San Carlos and Castro Islands, Chili. In many instances injury occasioned by these weevils was quite noticeable. But a few of the tubers which superficially appeared to be sound, on being opened, were found to be infested with one, and sometimes two, larvae or adults.

Two adults were kept alive from May 24 to September 6. During this period they fed but little and then only on foliage of potato.

This species has been determined by one of the authors (W. D. P.) as *Rhigopsidius tucumanus* Heller,[2] a species originally described from Tucuman, Argentine. It belongs to the subfamily of weevils known as *Rhytirhininœ*, tribe *Rhytirhinini*. The nearest North American insects are the species of the genus *Thecesternus* in the tribe *Thecesternini* of the same subfamily. Nothing whatever is known of the habits of this latter tribe, and the habits of only one species in the *Rhytirhinini* have been indicated.

The specimens at hand may be described briefly as follows:

Length 9 mm., yellowish or purplish brown, with thickly matted vestiture of a cinerous shade mottled with black dots. Head concealed from above by prothorax and eyes, almost covered by the lateral prothoracic lobes. Beak moderately short, usually reposing in a deep pocket of the

[1] Determined by Mr. August Busck.

[2] Stett. Ent. Zeit., 1906, vol. 67, pp. 7–9, pl. I figs. 3, 3a, 3b.

prothorax, which is posteriorly limited by the anterior coxae. Beak medianly and laterally carinate to a cross between the bases of the antennal scapes. Scrobes deep and narrow from apex near tip of beak almost to eyes, then sharply deflected and broader in front of eyes. Scape stout, clavate. Funicle 7-jointed, the last joint apparently a part of the club. Club 4-jointed. Head at base of beak sinuately impressed, with swellings above the eyes. Prothorax very irregularly sculptured but with a deep median furrow widened angularly at middle and also behind. Strial punctation deep but irregular. Intervals tumid behind. Legs stout. Tarsi with third joint not widely bilobed; tarsal claws simple. First and second abdominal segments long; third and fourth shorter than fifth.

A NEW BRACONID FROM SOUTH AMERICA.

By S. A. Rohwer, *Bureau of Entomology.*

Monogonogastra wolcottii, new species.

In Szepligetti's arrangement this species falls next to *meridensis*. The following description will show how different it is. In Cameron's list of species it falls next to *Iphiaulax hector* Cameron, but is at once separated from that species by the suture-formed articulations being striate. It resembles Cameron's species, however, in general habitus and color.

Female.—Length 14 mm., length of the ovipositor 12 mm. Antennae extending back beyond the apex of the third tergite; head shining, front depressed between the ocelli and the antennae; a strong carina from the anterior ocellus to the bases of the antennae; ocelli surrounded by a deep furrow, posteriorly bottom of the furrow is granular; postocellar line distinctly shorter than the ocellocular line; thorax shining, the scutellum raised slightly above the level of the scutum; first tergite with the embossed area broadening apically into a rounded spade-like area the apex of which is obtusely rounded; embossed area of the second tergite tiangular, not reaching apex, defined laterally by shallow, broad, foveolate furrows; suture-formed articulations foveolate; tergites shining, polished; apical sternite extending more than the width of the femora beyond the apex of the abdomen. Rufo-ferruginous; head except the palpi, antennae and sheath of the ovipositor black; posterior tarsi dusky; wings yellowish hyaline basad of the basal vein, beyond dark brown, a transverse yellow band beneath the stigma; venation dark brown; stigma bright yellow.

Golden Fleece, Demerara, South America. Described from one female collected March 13, 1913, by G. E. Bodkin and G. N. Wolcott.

Named for G. N. Wolcott.

Type: Cat. No. 16020 U. S. N. M.

Actual date of issue October 2, 1913.

ABOVE. SECTION OF POTATO FROM PERU, SHOWING LARVAE OF *Rhigopsidius tucumanus* IN ITS BURROW.
BELOW. SECTIONED POTATO SHOWING BURROWINGS OF *Rhigopsidius*.

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON

VOL. XV 1913 No. 4

MEETING OF JUNE 5, 1913.

The 269th regular meeting of the Society was entertained by the Executive Committee in the Saengerbund Hall, 314 C street N.W., on the evening of June 5, 1913. There were present Messrs. Baker, Barber, Boeving, Busck, Cushman, Duckett, Ely, Fisher, Gill, Greene, Heinrich, Kirk, Knab, Pierce, Quaintance, Rohwer, Sanford, Sasser, Schwarz, Shannon, Turner, and Wood, members, and Messrs. W. S. Abbott, Jacob Kotinsky, and Dr. William H. Fox, visitors. President Busck occupied the chair.

Mr. Rohwer stated that he had received a letter from Dr. Sharp who was recently elected Honorary Member stating that he was sending for the use of the society a copy of Fauna Hawaiiensis. The publication is to be filed in the Division of Insects Library at the National Museum.

The following papers were presented.

NOTES ON THE LIFE HISTORY OF RHOPALOSOMA POEYI CRESSON.

BY J. DOUGLAS HOOD, *Biological Survey.*

While collecting on Plummer's Island, Maryland, the sixth day of last October, an adult female of the jumping tree cricket, *Orocharis saltator* Uhler, was seen scampering over the forest floor as rapidly as a large abdominal protuberance and a nearly functionless hind leg would permit. It was placed in a pill box and later transferred to a suitable rearing cage for observation.

The protuberance proved to be an external parasite, the larva of *Rhopalosoma poeyi* Cresson. It was attached at the third ab-

dominal segment of the cricket to the membrane between notum and pleuron, and lay along the right side of the abdomen; the posterior end at time of capture was about opposite the metathorax, and the anterior end at the eighth abdominal segment. The sac was reniform, leathery in texture, brownish gray in color (slightly darker than the cricket itself), and nearly circular in cross-section. Its size and place of attachment thus forced the hind leg downward and far out of its normal position; but, aside from the loss of the use of this member of its body, the cricket appeared to be but little inconvenienced.

During the next few days the parasite increased rapidly in bulk until, on the morning of the ninth, three days after capture, it was about equal in size to the abdomen of its host, measuring just 7 mm. in length and 3.5 mm. in diameter. At 1 p.m., the integument was seen to have split in front along the median dorsal line,

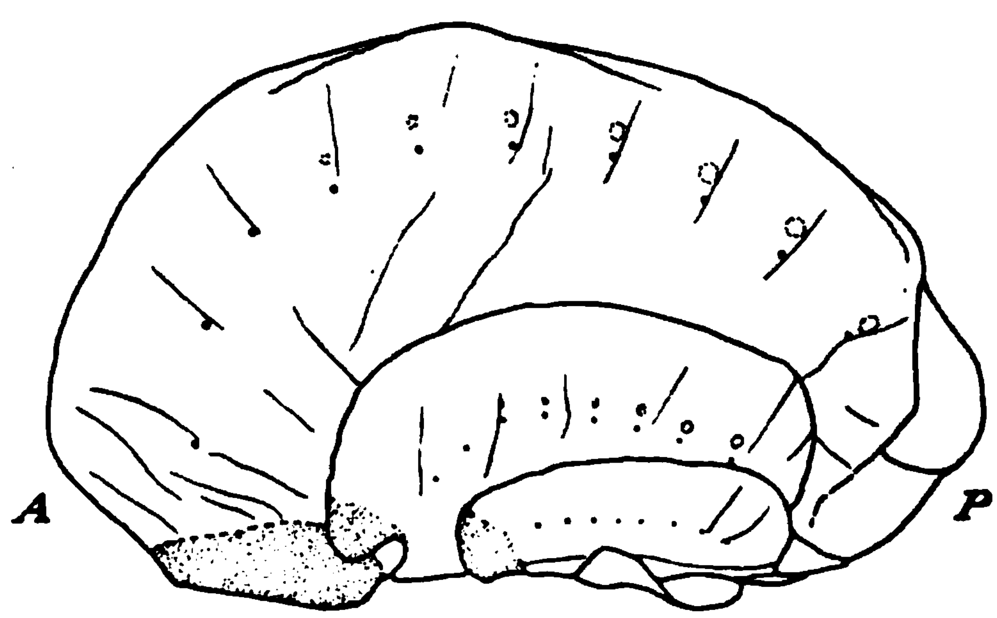


Fig. 1. Exuviae of *Rhopalosoma poeyi* Cr. *A*, anterior; *P*, posterior.

and through the split projected the head of the larva. By 2 p.m. three body segments were exposed above, the larva furthering this process by movements of the body. The cricket remained nearly motionless, only occasionally vibrating its palpi. At 4.30 p.m. there seemed to be no change, and further observations could not be made until the next morning. Then the cricket was dead; the sac was split along the dorsum from end to end; and the parasite itself was beneath the soil. Here it remained until some time in December when, at the suggestion of Mr. H. S. Barber, it was removed and placed in a plaster cell. According to Barber, the adult emerged indoors about March 1.

The several exuviæ (fig. 1) which remained attached to the cricket after the penultimate ecdysis indicate at least five larval instars, inclusive of the one passed underground. Towards the point of attachment the surface is smooth and shining, becoming granulate

externally. Each larval skin shows about ten spiracular openings, and above the posterior six or seven are nearly circular membranous areas. Anteriorly the exuviæ are thickened, darker in color and more shining, as indicated by the stippled areas in the figure.

——Mr. Rohwer commented on Mr. Hood's paper as follows: Mr. Hood is to be congratulated for bringing before science these interesting notes on one of the most remarkable Hymenopterous insects known. *Rhopalosoma* Cresson is a genus which is very difficult to place and many of the most able Hymenopterists have expressed their views as to its systematic position. To give some idea of the difficulty in placing this genus the following summary of locations it has occupied is given: Cresson described it as an anomalous Braconid; Haliday considered it as a Sphecid related in some extent to *Sceliphron*; Westwood originally considered it related to the Vespidæ, but later considered it as a fossorial Hymenopteron; Smith at first placed it among the ants, but on closer examination placed it in the parasitic Hymenoptera; Ashmead, before this Society, in 1896, summed up the characters of this remarkable genus and ended by making a new family for it, which he placed in his heterogeneous superfamily Vespoidea; Morley 1910, states that it can be "placed nowhere among the Parasitica or Terebrant Hymenoptera," and adds that no matter where it is placed it will form an aberrant group. The author of these remarks believes that Ashmead was more nearly correct than any of the other authors, but is of the opinion that the Ashmedian superfamily Vespoidea could be well divided into a number of smaller and more natural superfamilies (and such has already been suggested by Mr. Banks when he proposed the superfamily Scolioidea) and that *Rhopalosoma* and the allied genus *Paniscomima* should form one of these superfamilies.

Heretofore the habits of the immature stages of this curious genus have remained unknown, and now that they have been outlined it is hoped that more study will be made of them, as it is very likely that they will throw some light on the systematic position of this interesting group. Even now one is confronted with the remarkable resemblance between the larva of *Rhopalosoma* and some of the Dryinids (for habits of the Dryinidæ see R. C. L.

Perkins, Bul. 1, pt. 1, Exp. Sta. Hawaiian Sugar Planters' Association). Perhaps the Rhopalosomidæ and the Dryinidæ had a common origin, as the larvæ would indicate, and the adults have specialized along different lines though retaining certain characters in common.

It may be interesting to add that the family Rhopalosomidæ is now represented by four species, one of which has been placed in a genus of doubtful standing. Three species have been reported only from the Neotropical region, and one which is known to occur in India and Ceylon from the Oriental region. The *Rhopalosoma poeyi* Cresson was originally described from Cuba but since has been reported from Jamaica; San Domingo; Hayti; St. Louis, Missouri; North Carolina; St. Augustine, Florida; Louisville, Kentucky; and now from the environs of Washington, D. C. Lest some marvel at this remarkable distribution it may be added that great care was used in making the determination of Mr. Hood's specimen and unless there are characters which have escaped both Ashmead and myself this species has the wide distribution given above. An excellent figure of this species is given on plate 24 (figure 9) of Thesaurus Entom. Oxon. 1874.

NOTES ON THE FEEDING HABITS OF TWO ADULT SAWFLIES.

By S. A. Rohwer, *Bureau of Entomology.*

The feeding habits of adult sawflies are very incompletely known, although a few European species have been observed feeding either on the pollen of plants or on certain insects. From the literature which has been published on this subject it is a rather accepted opinion that the species of *Tenthredella* and *Tenthredo* feed, in the adult stage, on other insects. The following observations will show that this is not always the case. As far as I have been able to learn the records refer to feeding habits of the female only. Do the males feed?

TENTHREDELLA LINEATA (Provancher).

On July 4, 1907, I found a female of the species devouring an adult Perlid which has been determined by Mr. Banks as *Alloperla signata* Banks. The adult sawfly was sitting on the foliage of *Heracleum lanatum.*

TENTHREDO ARCUATUS (Foerster).

On August 8, 1909, at Sonnenberg, Lucerne, Switzerland, I had the opportunity to make the following observations on the feeding habits of an adult which belonged to this species. This adult had only one antenna, but as far as could be observed behaved in a perfectly normal manner, and was so docile that it could be observed under a half inch lens. This female would fall, alighting heavily on the head of one of the common Umbellifers and, due to the momentum of the flight, would fall beneath the head of the Umbellifer. After recovering itself and righting itself on the flower, it would bite a stamen off near its base and fall beneath the crown of flowers holding itself downward by the four posterior legs. In this position it proceeded to devour an entire stamen, using the maxillary palpi, mandibles and labrum, but the labial palpi did not move. After the entire stamen had been devoured the sawfly would repeat the operation until it had completely devoured four stamens. After devouring four stamens it walked over the head of the flower and by use of the palpi obtained the small drops of liquid adhering to the base of the receptacle. After visiting all the flowers on the head, the insect took flight. To make sure of the species it was captured before it had the opportunity to alight on another flower. The species of Umbellifer was not determined.

In commenting on this species in the Entomologist for February, 1913, Morley states that he has seen it chase flies and has known of one female found masticating a female *Empria pennipes*.

TWO ABNORMALLY DEVELOPED SAWFLIES.

By S. A. Rohwer, *Bureau of Entomology.*

Although the sawflies often have abnormal venation, it is very seldom that a sawfly with abnormal body characters is ever collected. As far as I am able to learn only seven gynandromorphic sawflies have been reported upon. In view of the fact of the usual stability in the bodies of sawflies the following notes may be interesting.

XENAPATES TERMINALIS (Say).

On May 13, 1911, along with other sawflies collected at East Falls Church, Virginia, an abnormal female of this species was collected. The abnormality occurs in the abdomen which does not have the gonapophyses developed except slightly, and the nates are abnormal. The cerci are normal as is the rest of the insect. The abnormal development of the eighth ventral and the entire

supplied in the extremely hard chitinization of the anal segment, and furthermore by the development of spiny processes around the elevated spiracles. To determine the utility of this apparatus, a specimen was placed in a glass tube the size of its original burrow, and from time to time disturbed by thrusting a bristle down the tube beside it. Immediately upon being touched this horny armature was thrown violently against the side of the tube pinching the bristle firmly. The fate of any Clerid or other predatory larva that should attempt to reach the soft forward part of its intended victim, can only be surmised, but this defensive organ appears perfectly effective. In two beetle larvæ a peculiar anal armature has been observed which appears to be more or less effective in the same manner, the first simply for defense, the second both defensive and offensive. The first is *Melitomma* (*Lymexylon*) *sericeum* in which the anal segment is very heavily chitinized, obliquely truncate, and strongly concave, the margin furnished with short stout teeth. This can be used to completely plug the gallery against an intruder, and by crawling backward to slowly force it out of the gallery. The other species is *Hylocœtus lugubris* a member of the same family, in which the first stage larva has an anal segment very similar to the last mentioned species, but which in later stages develops into a long horny process armed on the dorsal side with sharp teeth. These, it is believed, would be fatal to any soft bodied enemy that should try to crawl past. The syrphid larvæ from the softer, more decayed logs however, were of a different type of anal armature in which only the spiracle prominence is chitinized. These also do not seem to make definite galleries, and are equally available to their enemies from all sides. As before stated they are believed to be a distinct species. A single specimen of *T. æqualis* was bred by Mr. Champlain amongst many *T. bombylans* so-called.

At first sight the larvæ of *Temnostoma* appear to be furnished with powerful out-turned mandibles comparable to those in the larvæ of the Eucnemidæ, and certain Hymenoptera, but these are probably only plates of the head that have become functional for boring, the real mandibles being internal within the mouth, which is well on the under side of the head. The speaker exhibited photographs and sketches of the specimens and their work.

Meeting of October 2, 1913.

The 270th meeting of the Entomological Society of Washington was entertained by Mr. E. A. Schwarz in the Sangerbund Hall. There were present Messrs. Baker, Banks, Barber, Boeving,

Busck, Cory, Craighead, Cushman, Duckett, Ely, Gahan, Greene, Heinrich, Hopkins, Howard, Kirk, Knab, McAtee, Middleton, McIndoo, Quaintance, Sanford, Schwarz, Shannon, Snyder, Walton, and Wood, members, and Messrs. Frederick Karl, Chas. Menagh and Drs. W. A. Hooker and Martini, visitors. Mr. Schwarz reported that the next number of the Proceedings had been printed and would be mailed to the members in a few days. The name of Dr. Martini was proposed by President Busck for corresponding membership and that of Mr. W. S. Abbott by Mr. Cushman for active membership.

Mr. Busck remarked on the difficulty experienced by the Secretary in securing notes given at the meetings. He also read a letter from Mr. Caudell, addressed from Copenhagen.

The following papers were presented.

BIOLOGICAL NOTES ON A FEW RARE OR LITTLE KNOWN PARASITIC HYMENOPTERA.

By R. A. Cushman, *Bureau of Entomology.*

The observations brought together here are presented with the consent and partly at the suggestion of Dr. L. O. Howard, Chief of the Bureau of Entomology.

PERILITUS AMERICANUS Riley.

This Braconid parasite of lady-beetles was very abundant in the region of Vienna, Virginia, during the fall of 1912, invariably, so far as the observations of the writer go, parasitic on *Megilla maculata*. This coccinelid, following its habit of congregating in large numbers in the fall in some protected place, used as shelter the burlap bands put around apple trees for trapping codling moth larvæ. Large numbers of these were parasitized by *Perilitus*. During the past spring the abundance of *Perilitus* was again noted, many lady-beetles astride of the parasite cocoons having been taken from low herbage, especially clover infested by *Macrosiphum pisi*. Although a number of other species of Coccinellidæ, encouraged by the unusual abundance of aphids, were fully as abundant as *Megilla*, none but the latter and a single specimen of *Hippodamia convergens* were found to have been parasitized.

Adult specimens of the parasite reared in the fall of 1912 when placed with various species of coccinellids attacked the different species apparently indiscriminately but no progeny resulted.

The first adult *Perilitus* secured in the spring of 1913 was reared May 5 from a *Megilla maculata*. This was fed on diluted honey and placed in a large vial. She was then given access to various species of coccinellids including *Adalia bipunctata*, *Anatis 15-punctata*, *Hippodamia glacialis*, *Coccinella 9-notata*, *Hippodamia convergens*, *Megilla maculata*, *Cycloneda sanguinea* (=*munda*), and *Hyperaspis* sp., as well as a number of undetermined larvæ. All of the species including the larvæ were observed to be attacked except *Hyperaspis* sp. The larvæ were apparently attacked at any point, while the adults seemed to be attacked only between the segments, usually those of the abdomen, although the sutures between the head and thorax and thorax and abdomen were not neglected.

In oviposition the parasite assumes a position exactly similar to that taken by *Aphidius*, facing the prospective host and thrusting the ovipositor forward beneath the body and between the legs. The parasite perceived the presence of the beetles from a distance of at least 1 inch, when she would show great excitement by rapid vibration of the antennæ and quick movement toward the beetle. Having approached within feeling distance she extended the ovipositor in readiness for the attack and began dancing about her prospective victim, advancing and retreating and finally, when a good opening offered, rushing in and giving a quick thrust. This was repeated with each beetle several times. Another female parasite reared May 14 was placed in the same vial and began its attack on the beetles immediately without taking food. At later dates other parasites were reared. All were females.

During the progress of the observations many beetles and larvæ were attacked. Of these only one, an adult *Megilla*, showed any further signs of parasitism. The parasite larva emerged from its host and spun its cocoon but did not mature.

The latest parasite to emerge in the spring appeared on June 14, having developed within the body of a *Hippodamia convergens*.

Some years ago there was published in Insect Life some discussion as to the point from which the *Perilitus* larva emerges from its host, the ventral sutures between the abdominal segments and that between the thorax and abdomen being suggested as possible points of egress. The actual emergence of the parasite from its host was apparently, however, never observed. On May 19,1913, it was my good fortune to find a *Megilla*, from which the parasite larva was just emerging. It was protruding from beneath the elytra of the host and had forced the tip of the abdomen downward. Very carefully I clipped the elytra and wings of the beetle to determine the exact point from which the parasite was coming. This point I found to be the suture between the fifth and sixth abdominal segments slightly to the right of the median dorsal line.

The parasite was apparently about one-third free. I hoped to determine the manner in which the parasite gets into its position beneath its host without losing its hold, and to this end carried the specimen in a vial in my pocket for the rest of the day examining it frequently. But unfortunately it seemed in some way to have been injured, probably when the elytra of the host were cut, and succeeded in getting no further. When the next morning it was still in the same position, I preserved host and parasite, after first

Fig. 1. *Perilitus americanus* Riley larva issuing from *Megilla maculata.*

sketching the specimen. The accompanying figure shows the relation of parasite to host (fig. 1).

All of the coccoons of *Perilitus* which were collected in the fall of 1912 produced adults during that season, and these adults readily attacked coccinellids. It seems probable, therefore, that the species hibernates as larvæ within the host.

PANISCUS GEMINATUS Say.

On August 22, 1912, under a band on an apple tree I found a Lepidopterous larva bearing just back of its head a pecular ex-

ternal parasite larva. It was evidently in the first stage, the head being dark and distinctly marked off from the rest of the body. It was semitransparent and of a pale greenish color. The peculiar thing about it, however, was the fact that its caudal end was inserted in a shining black, goblet-like receptacle, the base of which was firmly attached to the body of the caterpillar. The receptacle, or egg-shell as it turned out to be, is shown in figure 2a, the larva and egg-shell at figure 2b, and the larva in situ on its host at figure 2c. When found the parasite was about one-eighth of an inch long and rather slender. As development progressed it became stouter and the head less distinct until, at full growth, when it

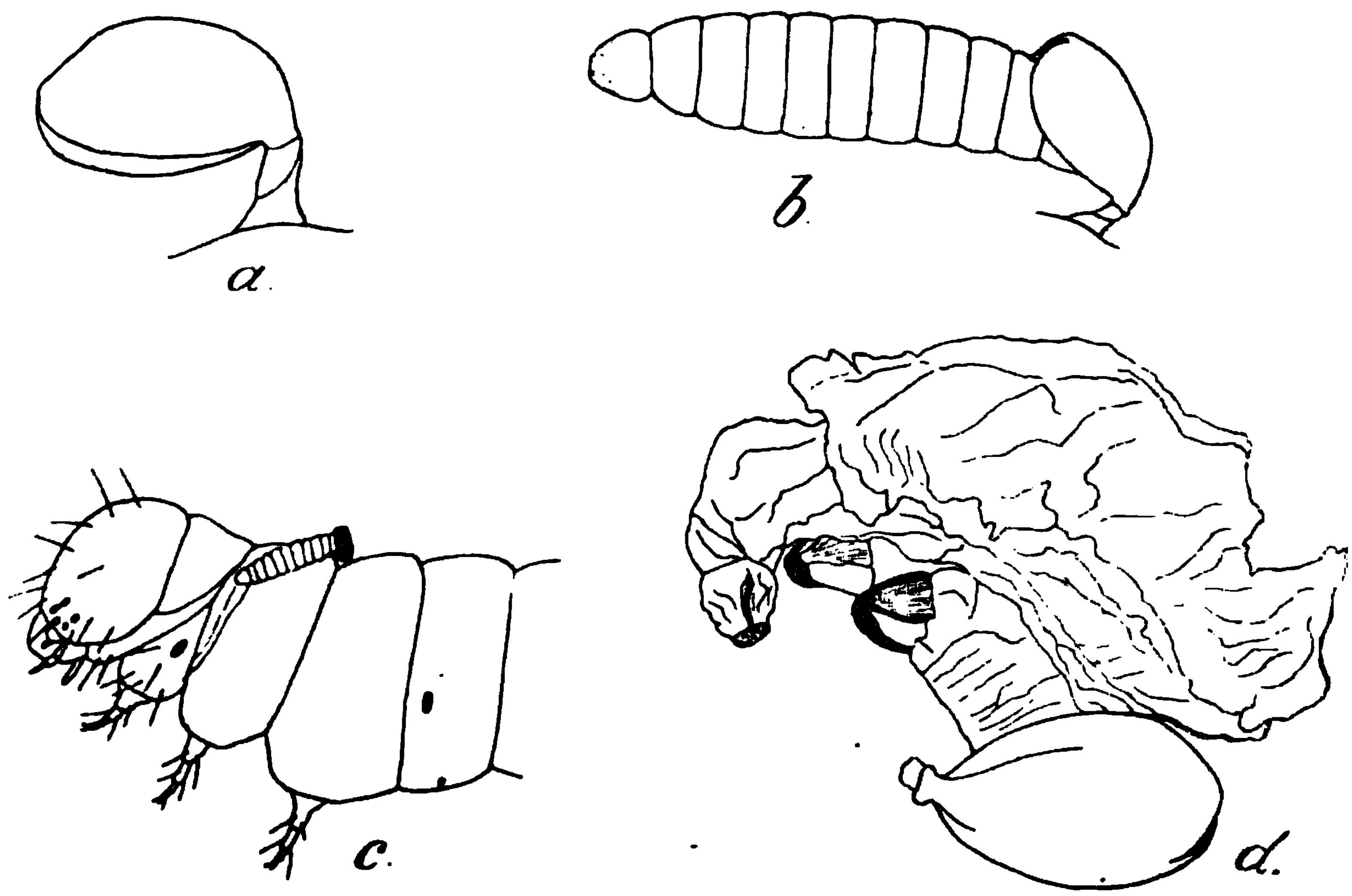


Fig. 2. Stages of *Paniscus geminatus* Say. *a*, egg shell; *b*, young larva attached to egg shell; *c*, young larva in situ on host; *d*, three larval skins attached to egg shell.

left its host and spun its cocoon, it was about one-half an inch long and a third as thick. During all this time it remained attached to its host by the egg-shell. Not until it left its host and spun its cocoon was it discovered that it had molted without releasing its hold on the egg-shell. Then it was found that there were attached to the shell three molted skins varying in size and texture with the age of the larva when they were discarded. The earliest molted skin was densest and the head shield quite heavily chitinized, the second somewhat less so, and the third very delicate and the head shield barely heavier than the body skin. This is shown in figure 2d.

Full growth was reached on September 10, thirty-two days after the specimen was found and by the morning of the 11th it had spun its cocoon. This was nearly black, about one-half inch long and almost cylindrical with rounded ends. In order to hasten the maturity of the parasite it was kept indoors during the winter, but the adult not appearing the cocoon was opened on March 10, and the parasite was found to have matured and died. That death had been quite recent was indicated by the fact that the parasite was not entirely dried. It is a female *Paniscus geminatus*.

POLYSPHINCTA TEXANA Cr.

On April 8, 1913,I found an adult female spider (*Steatoda borealis*)bearing an external parasite larva. The parasite was about three-sixteenths of an inch long and was curled transversely about the front end of the abdomen of the spider. The large size of the parasite together with the early date probably indicates that it had hibernated on or in its host. By the next day within a period of about seventeen hours the parasite had increased to nearly double its length when found and the contents of the abdomen of the spider had been entirely consumed. The larva was placed in a cell between two slips of transparent celluloid to make further observations on the development possible. On April 12 the parasite had started its cocoon but never finished it and died without pupating.

On April 10 another spider of the same species was found bearing a similar parasite larva. In this case the larva was not more than one-eighth of an inch long. By April·14 this parasite had consumed the liquid contents of the host and by April 16 had constructed its cocoon. This was slightly less than one-half inch long by about one-third as wide and somewhat more tapering toward the caudal end. It was loosely woven of pale yellowish, very curly silk. On April 25 the parasite pupated and on May 9 it transformed to the adult condition. This gives a period from the time of leaving the host to pupation of eleven days and a pupal period of fourteen days.

When, on May 12, the adult parasite had not left its cocoon and was inactive the cocoon was cut open and the dead parasite, a deformed female *Polysphincta*, removed.

SPHÆROPYX BICOLOR Cresson.

Apparently nothing concerning the host relations of this species has been published. Under my codling moth bands on apple and pear trees I have frequently taken it in immature stages as a parasite of *Apatela clarescens* Guen. The parasite is gregarious, as many as 30 having been reared from a single host.

On October 14, 1911, two caterpillars of *Apatela* were taken under bands and put in vials. One of these was healthy and pupated later. Concerning the other, which it later developed was parasitized by *Sphœropyx*, my notes are as follows: "The parasite larvæ emerged from the host this morning. They issued from various points along the back and sides of the host, appearing at first as whitish papillæ, and gradually forced themselves through openings of smaller diameter than their bodies. When first emerged they were about three-sixteenths of an inch long, but within a few hours they nearly doubled in size, simply engorging on the fluids of the host."

Another caterpillar taken with others on July 23, 1912, turned out to have been parasitized, when three days later on July 26, about twenty-five of the large pinkish larvæ of *Sphœropyx* were found to have issued from it. These had reached full size when the fact of parasitism was discovered. Seven were placed in cells between slips of transparent celluloid for observation on the further development. The cocoons had been spun by the next morning. On August 1 the following notes were made: "As the pupa develops within the larval skin the pink color becomes concentrated in the abdominal region, becoming especially evident as a red streak along the median line where there are no fat bodies to obscure the color. This morning, the insect being in what may be termed the prepupal condition, this coloring matter has been discharged as a wine colored liquid and the insects are opaque white. As the prepupal condition is assumed there is a considerable, gradual shortening of the body." On August 8 five of the parasites pupated. The other two died without pupating. By August 10 the pupæ had begun to assume the adult colors, the head and thorax having become black, and on August 12 the abdomen had become red. On August 13 three had transformed to the imago and on August 14 the other two had done likewise. The first three to transform emerged on August 15 and the others on August 16. That the development was not influenced by the method of handling was shown by the fact that adults were reared from other larvæ on the same host at the same time as from those in the transparent cells.

The development from the time the larvæ emerged from the host to the date of the issuance of the imagoes was as follows: from emergence to spinning of cocoon 1 day, from cocoon to pupation 6½ days, pupal period 10½ to 11½ days, period from transformation to emergence 2 days, period in cocoon 19 to 20 days, and total period from emergence of larva from host to issuance of adult 20 to 21 days.

All of the specimens reared from the above lot were males. From a number of hosts only females were reared, but from a majority

of hosts the parasites of both sexes emerged, the males issuing from one to two days ahead of the females. The following table gives the proportion and distribution of the sexes so far as this was determined.

Table showing proportion of males an dfemales of Sphæropyx bicolor Cr. in specimens reared from individual hosts.

♀	♂	♀	♂	♀	♂	♀	♂
15	3	17	2	2	1	17	2
0	8	3	0	29	0	10	4
25	0	11	10	26	0	16	12
9	0	0	24	13	3	22	0
18	0	17	13	1	2	14	1
14	1	17	0				
				Total,		296	86

When the cocoons, which are of white silk, are spun under natural conditions within the host cocoon they are packed parallel in a close mass with their axes nearly perpendicular to that of the host cocoon. The parasite hibernates as a larva within its cocoon.

Very frequently *Sphæropyx bicolor* is attacked in its cocoon by *Dibrachys boucheanus* Ratz., an omnivorous secondary parasite, although it is but seldom that all the cocoons in a mass are parasitized.

Two cases of double primary parasitism in which this species took part were observed. The other species in each case was a tachinid fly. In the first case the tachinid eggs were found on the skin of a caterpillar, from which a few days later the larvæ of *Sphæropyx* emerged. In the other instance, an adult tachinid was reared followed three days later by nine females of *Sphæropyx*.

The discovery that certain members of the subfamily *Cheloninæ*, to which *Sphæropyx* belongs, parasitize the eggs of their host, their larvæ issuing later from the host larvæ, led to the conducting of experiments on a small scale to determine the oviposition habits of the species under discussion. Some eggs of two species of *Apatela*, one of which feeds on wild cherry and the other on pear, were secured and exposed to the attack of *S. bicolor*. It was noted that while the parasites took no notice of the eggs they showed great excitement when on leaves bearing eggs, running rapidly about dragging their ovipositors over the surface of the leaf and searching minutely with their antennæ. No such excitement was shown when uninfested leaves were supplied. This suggests that the search for hosts may possibly be guided somewhat

by the scent left by the parent moth on the leaves on which she oviposits. At about this time a larva of *A. clarescens* about one-third grown was found. This was placed in the cage with the parasites. They seemed to be interested only in avoiding it.

A few days later some of the *Apatela* eggs hatched. The newly hatched larvæ were exposed to the attack of the parasites and were almost immediately attacked, the parasites fairly pouncing upon them. During the act of oviposition the host larva is beneath the parasite, whose ovipositor is extended forward and inserted in the side of the host. Subsequently caterpillars of various sizes up to a third of an inch in length were exposed to the attack of the parasite, but in no case was any except newly hatched or very young caterpillars attacked. All larvæ that were attacked by the parasite were isolated and fed in order to obtain further data on the life history of the parasite. Most of them died while very young, while those that lived produced only moths, so that there is only negative proof that the attack observed in the cages is the natural one.

At one time during the progress of the experiments with *S. bicolor* a large number of living females were confined together in one cage, which was placed against the screen of the insectary. Several males of the species were captured on the outside of the insectary, having evidently been attracted by the scent of the females.

——In the discussion of Mr. Cushman's paper, Dr. Hopkins called attention to a reference in an early number of Insect Life (III, p. 20) to his observation on the parasite, *Perilitus*, of the adult of *Hippodamia maculata*, and the evidence found by him that the parasite larva emerged from the ventral part of the body, through the suture between the abdomen and metasternum.

Dr. Hopkins also mentioned, in this connection, the common occurrence of parasitized adults of Scolytid beetles, especially those of the genus *Ips*. The parasite (*Tomicobia tibialis* Ash. det. Ash.) oviposits through the elytral suture and the adult emerges through a round hole in the declivity. Dead or living adults are often found in the insect boxes, having emerged after the beetles were mounted on card points.

——Dr. Howard said that work of the character just described by Mr. Cushman was of very great value. This and similar work carried on by Mr. Timberlake, and which also related to the intimate life history of parasitic insects, has much potential prac-

tical value. We must know the full biology of parasites before we can handle them practically with any certainty. So much of this character is being done in the Bureau, and so little elsewhere, that it is important that any parasite introduced by a state Entomologist should be referred to the Bureau before liberation.

Dr. Howard, referring to the external feeding Ichneumonid (*Paniscus geminatus*) mentioned by Mr. Cushman, said that Hymenopterous parasites of naked hosts—that is, host insects not sheltered by a cocoon, or in a twig, or in a leaf—live internally as a rule, and that it is very rare indeed to find an external Hymenopterous parasite on an unprotected host insect. Almost the only exception that ocurred to him was that of *Euplectrus comstockii* How., which had been described many years ago by Mr. Schwarz. In fact, it sometimes happens that the same species of parasite, in its larval stage, will feed exteriorly upon a protected host, and interiorly upon an unprotected host,

In reply to Dr. Howard's remarks on external parasites of free living larvæ, Mr. Cushman stated that *Paniscus* does not belong strictly to this class since, although its egg is deposited on a free living larva, its feeding is done after the host has spun its cocoon.

——Mr. Schwarz, in remarking on the paper, said that most parasites of inside feeding larvæ are external feeders.

——President Busck stated that several parasites are internal feeders and mentioned the Solidago gall maker, *Gnorimoschema gallæsolidaginis* Riley, which is commonly infested with polyembryonic internal parasites.

——Mr. Cushman said that *Tetrastichus hunteri*, a parasite of the boll weevil, is not only an internal feeder but also pupates within the host.

——Mr. Schwarz stated that *Adalia sanguinea* is common in Central and South America and is found only in the United States in tropical Florida. He referred to the first report of the Experiment Station of Cuba, in which Dr. George Dimmock pointed out the difference between the larvæ of *Adalia sanguinea* and *A. munda*. Finally he said that *Magilla maculata* is commonly found in low places.

——Mr. Cushman remarked here that most of the parasitized specimens from Vienna, Virginia, came from high ground.

EPIMECIS WILTII CRESSON AND ITS HOST.

By Raymond C. Shannon, *Bureau of Entomology.*

The life history of the Ichneumonid, *Epimecis wiltii* Cress., as far as could be ascertained, is entirely unknown. The observations here presented show that its larva is an external parasite of spiders. Another genus, *Polysphincta*, of the same family, has very similar habits, being also an external parasite of spiders.

While collecting with Mr. C. Shoemaker at Black Pond near the mouth of Difficult Run, Virginia, September 14, 1913, a spider, (*Epeira trivittata* Keys.) was found which had a very small parasitic larva, probably recently hatched, upon its thorax. The spider with larva attached was brought to the Museum and placed in a breeding jar, where the spider soon spun a web, in which it stayed. The larva grew gradually, while the spider remained alive, and apparently quite healthy, until the sixth day. The larva was then found to have grown to over twice the size that it had been the previous day. It was now hanging by two of its prolegs to a strand of the spiders web, and with its mouth thrust into the spider's abdomen, was supporting the dead and collapsed body of its host. The following morning it had dropped the spider and had spun its cocoon among the threads of the spider's web. The adult issued eleven days later, October 1, 1913.

CHANGES DURING QUIESCENT STAGES IN THE METAMORPHOSIS OF TERMITES.

By Thomas E. Snyder, *Bureau of Entomology.*

There have been several theories as to when the larvæ of termites become differentiated to the various castes in the social organization, the prevalent one being that undifferentiated larvæ are developed to the castes by the character of the food that they receive. The results of Heath's[1] experiments, however, to determine the relation of various kinds of food to polymorphism, were negative. In the case of ants, Wheeler[2] with Emery believes, "the adult characters to be represented in the germ as dynamical potencies or tensions rather than morphological or chemical determinants" and that "nourishment, temperature and other environmental factors merely furnish the conditions for the attainment of characters

[1] Heath, H. The Habits of California Termites. Biol. Bull., Woods Holl, vol. IV, December, 1902, pp. 47–63.

[2] Wheeler, W. M., The Polymorphism of Ants, Bull. Amer. Mus. Nat. Hist., vol. XXIII, January, 1907, pp. 1–93.

Leucotermes flavipes Kol., 1, LATERAL VIEW OF THE QUIESCENT STAGE OF NYMPHS OF THE FIRST FORM, SKIN ALREADY CAST; 2, DORSAL VIEW OF SAME; 3, ACTIVE MOLTED NYMPH OF THE FIRST FORM WITH WINGS UNFOLDING.

Leucotermes flavipes Kol., 1, Quiescent Stage of a Molting ♀ Nymph of the Second Form; 2, Molted ♂ Nymph of the Second Form or Neoteinic King, Cast Skin Still Attached to Legs; 3, Mature Neoteinic King.

predetermined by heredity." Bugnion,[1] studying *Eutermes lacustris* Bugn. and *Termes redemanni* Wasm. and *T. horni* Wasm. states that the differentiation takes place during the embryo stage for the three castes, rather than undifferentiated larvæ being developed to the castes by the character of the food they receive.

Observations by the writer of molting soldier larvæ of *Leucotermes* spp. and *Termopsis angusticollis* Walk. show that the differentiation of the soldier caste takes place during a "quiescent"[2] stage rather late in the life cycle. Differentiated nymphs of the first and second (?) forms of *L. virginicus* Bks. have been observed in the quiescent stage, 2.5 mm. in length. At this point a brief outline of the life cycle is necessary.

In the metamorphosis of the above species the eggs hatch into active, undifferentiated larvæ, which develop to the various mature forms or castes by a gradual growth through a series of molts and "quiescent" stages. During the quiescent stage both the larvæ and nymphs pass through an inactive period, of comparatively short duration, isolated, lying on the side, head bent down to lie on the ventral side of the body along which the antennæ and legs also lie extended in a backward direction. The writer first observed molting larvæ in a quiescent stage on August 11, 1911, in a colony near Jerseyville, Illinois. During April, 1912, the development of nymphs of the first and second (Lespès) forms of *Leucotermes flavipes* Kol. and *virginicus* Banks was observed at Falls Church, Virginia, and it was noted that both these nymphs (plates VI and VII) passed through a quiescent stage in the final molt to the reproductive forms; nymphs of the first form of *Termopsis angusticollis* Walk. also pass through the quiescent stage. From the first to the middle of August 1913, freshly molted pigmentless soldier nymphs of *flavipes* in the stage preceding maturity were noticeable in colonies in Virginia. On August 17, 1913, molting soldier larvæ were found in the quiescent stage in a colony of *virginicus* at Chain Bridge, Virginia. During the quiescent stage differentiation took place. Larvæ to all external appearances undifferentiated or of the worker type (as shown by the head, mandibles with marginal teeth and labrum of the still adhering larval skin), the individuals (*virginicus*) being over 3 mm. in length in the quiescent condition, antennæ with 14 segments, develop at this molt to pigmentless nymphs of soldiers with more elongate, soldier-like head, and sabre-like mandibles without marginal teeth. In this stage the head, mandibles, labrum, and "menton" (Bu-

[1] Bugnion, Pr. E. La différenciation des castes chez les Termites. Bull. de la Societé entomologique de France, No. 8, April, 1913, pp. 213–218.

[2] Strickland, E. H., A Quiescent Stage in the Development of *Termes flavipes* Kol. Jour. N. Y. Ent. Soc., vol. XIX, No. 4, December, 1911, pp. 256–259.

above described. These were greatly distended with blood, and were so intent on feeding that he was able to pick them off and place them in alcohol.

One of the first five specimens from which Coquillett described the species, (Ent. News, vol. 18, 1907, p. 102) was found in the early morning on the floor of the cabin at Plummer's Island, beside a blanket on which a person had been sleeping during the night. It was so heavily engorged with blood, supposedly from the sleeper, that it could not fly.

In view of the abundance of *Phlebotomus vexator* about the cabin on Plummer's Island during June and July, it seems remarkable that no observations of its attacking man, have been made. Its nocturnal habit, with possibly a painless bite and silent flight, may explain this. Another species found in Guatemala, *Phlebotomus cruciatus* Coq., was observed by Mr. Barber to bite man and cause annoyance, (see note by Barber, Proc. Ent. Soc. Washington, vol. 8, 1906, p. 102).

In India a species of *Phlebotomus* has been observed sucking the blood of a toad. (Maxwell Lefroy, H., A Preliminary Account of the Biting Flies of India, 1907 p. 16).

——Mr. Knab said that Mr. Shannon's observations were very interesting in that they showed a well marked difference in the feeding habits of the different species of *Phlebotomus*. This is strikingly confirmed by observations recently made in another part of the world. It is recognized that *Phlebotomus papatasii* of the Mediterranean region, which is the vector of the so-called pappataci fever, is associated with man in much the same way that are certain species of mosquitoes, frequenting houses and the females sucking his blood. It has been assumed that the other species of *Phlebotomus* also readily attack man. F. M. Howlett, in a paper which has just come to hand, now shows that another species common in the Orient has a marked preference for the blood of Geckos (Indian Journ. Med. Research, vol. I, pp. 34–38, pl. 9; July, 1913). Howlett states that *Phlebotomus minutus*, in its biology, is closely associated with these lizards. He shows that the geographic distribution of *Phlebotomus minutus* and of the Geckonidæ correspond very closely. Furthermore, *Phlebotomus minutus*, whether in houses or out-of-doors, is always associated with the Geckos, and it is useless to seek it elsewhere. The larvæ

of *Phlebotomus minutus* are found in crevices between bricks and stones, where the Geckos hide and where the excrement of the lizards furnishes them suitable nourishment. But the association with the Geckos is closest in the adult females, as these normally suck the blood of the lizards. "In a bungalow in which *P. minutus* is fairly abundant, careful examination of the lizards on the wall, at almost any time of day or evening, may reveal that perhaps every other lizard has a sand-fly perched on its back and sucking its blood. . . . I believe that there is no doubt that the flies have a distinct preference for biting lizards as compared with men; that they are, in fact, primarily parasites of the lizard. To us they are troublesome only in the hot months, generally in the late evening or very early morning, and it is extremely difficult to get them to bite the hand or arm in the laboratory during the day. Geckos confined with sand-flies are, on the other hand, freely bitten at any hour of the day, as well as in the evening, and one lizard may have several flies biting at once, this may happen, moreover, just after the flies have completely refused to bite a human wrist."

Professor Quaintance exhibited specimens of cranberries having numerous galls on the leaves and asked for information as to what was the cause of the peculiar growth. Mr. Banks suggested that it might be caused by the mite, *Eriophyes vaccinii*, or some Cecidomyiid.

——Mr. Banks exhibited specimens of a Psyllid, *Livia marginata* Patch, taken near Falls Church, Virginia, on the leaves of a sedge. This species was figured by Miss Patch in Psyche from two specimens from Connecticut. The insect deforms the lower leaves of the sedge to form a tuft of white leaves that are very prominent.

——Mr. Knab discussed the life history of *Dermatobia*. Infestation of man with the larva is common in the American tropics and the larvæ are also common in cattle, horses, and other mammals. Nothing has been known of the manner of infestation, and it has been assumed that the eggs are deposited directly on the host. The probability that the infestation is not direct was indicated by the large number of eggs (750 to 800), found by Neiva in dissections. Now Surcouf of Paris has received South American

mosquitoes (*Janthinosoma*) with clusters of eggs of *Dermatobia* attached beneath the wings. It would appear, then, that the eggs hatch and the larvæ are transferred to the host, while the mosquito sucks blood. As to the manner in which the eggs are attached to the mosquito, Surcouf accepts the explanation of Gonzales-Rincones of Venezuela, who had transmitted the specimens. The latter is credited with a statement that the eggs, along with a viscous substance, are deposited upon the foliage and that they become attached to the mosquito accidentally as it walks over the leaf. This explanation, the speaker said, he could not accept. The eggs were found attached to a part of the mosquito's body which does not come near the leaf surface when the mosquito rests upon it; also the eggs are attached in a definite way by their bases and with the hatching end outward, and this could hardly be accomplished accidentally. Furthermore, under the circumstances assumed, the eggs for the most part would be picked up by other insects, which would not bring about their transfer to a suitable host. There is no reason to doubt that the eggs discussed by Surcouf are really those of *Dermatobia*, and his statement shows that these eggs have been repeatedly found attached to mosquitoes. Remarkable it is that in every case the mosquito appears to have been a *Janthinosoma*. Prof. Urich, of Trinidad, has called Mr. Knab's attention to the fact that he has also found *Janthinosoma* with the eggs attached, and that in 1905 he sent such a specimen to the Bureau of Entomology, but that he received no satisfactory explanation.

——Dr. Martini gave a short address, thanking Dr. Howard and other members of the society for the help they had given him. He stated that before leaving Hamburg, he had been informed that he would be able to obtain much assistance while here, but he found upon his arrival even more help than he had anticipated.

——Dr. Howard gave a brief account of his western trip in company with Dr. Marchal, mentioning a few incidents that occurred during the journey.

——Mr. Schwarz spoke of the occurrence of *Psylla buxi* Linn. He said he had observed this insect in great numbers at Atlantic City many years ago. Mr. Banks said that he had taken this insect two or three years before in New York City on box hedge.

——Dr. Hopkins called attention to the probable introduction of a destructive European Scolytid into this country, specimens of *Myelophilus piniperda* L. having been recently sent to him for identification by Dr. T. J. Headlee, of the New Jersey Experiment Station, with the statement that it had been found boring in living shoots of pine in one locality of his state.

Dr. Hopkins also mentioned a record by Dr. Leconte in 1868 of this insect from New York, but it had never been known whether it was collected in the field, or had come from some collection of foreign insects through a mistake in labeling.

FOREST MALARIA.

By Dr. A. Lutz, *Rio de Janeiro.*

I have received from Doctors Knab and Dyar answer to my statements concerning the transmission of malaria by wood mosquitoes, in which they not only refuse to be convinced but repeat their accusations of overlooking and misunderstanding elementary facts. I only want to make plain, why I have protested and leave it to the members to decide, if their way of arguing ought to be approved.

In order to suit their theory Galli-Valerio must have mistaken another anophelid for *Myzomyia lutzi*, though this is an extremely characteristic species which can be distinguished from all others by a glance at the scutum. Lutz and Chagas must have overlooked the presence of other anophelids at the places of their observations. Now Lutz and Chagas might be expected to know anophelids, as they worked with them for years and together indicated most of the Brazilian species. Both made formal declarations and I have a written statement from Dr. Chagas to the point that he looked carefully for other anophelids while he treated the epidemic on the spot. At that time he did not know me, nor my paper and made his observation quite independently. Those facts are considered of no account, because Dr. Knab found in Central America other anophelids, in localities which he takes to be similar. He even mentions *Anopheles eiseni*, a species which has never been found in the states of Rio and São Paulo where the observations were made. I am also accused of overlooking that men are men, and it is stated that the men must have got away at night and infected themselves elsewhere. I have already declared that they lived many miles away in the woods and there was no

other way to travel than on foot. Even if they had escaped control, the nights would not have been long enough to let them reach a place where they might have found what is suggested, nor would that help in any way, as there was and is no malaria in those places. Arguing like that you might also say that the Italian sailors who got yellow fever on board of a man-of-war anchored in Rio harbor far away from the land, were attacked because they swam on shore at night time, following a classical example.

Messrs. Dyar and Knab think that mosquitoes, which have never been in contact with men before, cannot transmit disease. In order to test their thesis, you must put men in absolutely uninhabited places. This is, generally speaking, rather difficult, but it so happens that in Brazil roads and railways have been made in such conditions and nearly always there have been epidemics of malaria. I know also of epidemics of Leishmania sores, with good reasons attributed to the transmission by *Phlebotomus*, observed in absolutely deserted zones. I have also seen a small yellow fever epidemic amongst people living in a place where only wood mosquitoes could be expected. All this shows that the theoretical considerations have not been respected by the facts and all that is wanted is that the transmitter, whatever may be its past, belong to a category in which the parasite can thrive; then it must have repeated access to human beings, some of them being infected and some not immune. As the process of development takes time, its life must not be too short. For that reason repeated oviposition is a favorable condition.

Thus the discussion from my side is closed but I fully maintain the correctness of my observations.

ON A COLLECTION OF NEUROPTEROID INSECTS FROM THE PHILIPPINE ISLANDS.

By Nathan Banks, *Bureau of Entomology.*

During the past year Prof. C. F. Baker has been sending me Neuropteroid insects from the Philippines for determination. Hardly any forms were recorded previously, and since most of them are new, it is desirable to publish the descriptions. Hardly sufficient material is yet available to show the relationships of the fauna, and very little is known from Borneo, but from Java a considerable number are described and some of these occur in the Philippines, but more often related species.

The 39 species here recorded are all from one island of the group and from a restricted part of that island. It is therefore probable

that the total fauna in these groups of insects will amount to several hundred species. The Psocidæ and the Trichoptera will be particularly rich in new species, while the several families like Panorpidæ and Coniopterygidæ as yet unrepresented will be found to occur in several species.

PSOCIDÆ.

Myopsocus enderleini Bks.

From Los Banos.

Cæcilius sp.

Two specimens from Los Banos; a plain unmarked species.

Psocus bakeri n. sp.

Markings in general similar to *P. cosmopterus*, especially the apical band of wings, the basal band runs obliquely across up to the radius, and is very broad behind. The stigma is prominently, uniformly reddish (not yellowish), and behind it is angulate. The first long joint of the antennæ is (except tip) pale yellow, not at all brownish; legs pale, tips of tibiæ and tarsi blackish. The radial sector and the median vein are united only at a point, and in some cases even connected by a short cross-vein.

From Los Banos, Philippines (Baker), on bark of tree in forest. Because of the shape of the median cell, and of the angulate stigma, and slightly different markings I think it is a separate species rather than a variety of *P. taprobanes*, these characters hold in all the numerous specimens. It is a size smaller than the Javan *P. taprobanes* in my collection.

Tæniostigma bimaculata n. sp.

Very pale yellowish throughout, with two large shining black spots on the mesonotum, one on each side lobe; antennæ deep black and black haired, basal fifth of the fourth (and others beyond) joint is white; no spot on head; last tarsal joint black, rest of legs pale. Wings with the lower border of the stigma brown (like *T. ingens*), the cubital vein also black and black bordered; the median cell much broader at tip than in *T. ingens*, and the median and radial sector united for a longer distance than in that species the "areola postica" has a very narrow base above on the median vein, scarcely one-half as long as that of the apical cells; radial sector forks a little before last branch of the median. Length, 7 mm.

From Los Banos, Philippines (Baker).

PERLIDÆ.

Neoperla clarissa Bks.

From Los Banos.

Neoperla recta n. sp.

Brownish, a dark spot on the clypeus; antennæ beyond first joint is black for some distance; setæ black at tips, tibiæ dark, wings with brown tinge, and brown venation. Ocelli large, about diameter apart, fully as close to bosses, which are situate about as far from eyes, clypeal margin truncate; pronotum strongly convex in front, much narrowed behind, surface rugulose. In fore-wings radial sector with three branches in female, two in male, in all cases with a few cross-veins between them; about 7 median, and 6 cubital cross-veins, and four cubitals in hind-wings, the veinlet connecting radius and sector straight; the first axillary in hind-wings ends in four branches, not connected to next axillary. The ventral plate of female is simply slightly, evenly convex. Expanse, female 35 mm.; male 27 mm.

Los Banos and Mt. Makiling.

Neoperla obliqua n. sp.

Wholly pale yellow; eyes and ocelli black and base of antennæ (except basal joint) rather dusky. Ocelli small, much more than diameter apart, as close to each other as to the bosses, these latter much nearer to the eyes; clypeal margin rounded; pronotum broader in front than head, a little narrowed behind, front margin only slightly convex, surface rugulose. Wings with venation pale yellow; no cross-veins in apical part of wing; radial sector with two branches beyond anastomosis, about 8 median, and 6 cubital cross-veins, in hind wings only 3 to 5 cubital cross-veins, the first axillary in hind-wing ends in three branches, one connected to next axillary; in the fore-wings the veinlet connecting radius and sector is strongly oblique. In female the ventral plate is not developed. Expanse, 35 mm.

From Mt. Makiling.

MYRMELEONIDÆ.

Formicaleon cleonice n. sp.

Head yellowish; a dark band below antennæ, and a fainter band above them; vertex with two rows of connected spots; pronotum with a broad median dark stripe, divided by a pale median line, and sides dark, between these dull gray yellowish, not clear, two long black bristles each side and lower sides with long white hairs; rest of thorax with median pale line, and interrupted pale stripe each side; pleura pale, with few dark spots. Abdomen dull blackish, first segment pale above, second with pale basal streak, forked behind, at middle of second and third segments is a distinct black spot, other segments pale on base, but not clearly marked, last segments with pale at each apical lower corner. Legs pale, femora infuscated above, tibiæ with premedian dark band, and other spots and dots, hind tibiae with dark line on inner side, tips of tarsal joints dark. Wings hyaline, veins with dark spots, radius with longer dark spaces, outer gradates dark,

forming an oblique streak, and the forkings of veins beyond are dark, stigma barely distinct, cross-veins dark at ends; in hind-wings there is a dark dot at end of median and cubital veins. Antennæ rather long and slender, annulate throughout with dark; pronotum planly broader than long, not narrowed in front; abdomen shorter than the wings; wings shaped as in *F. dirus* and *F. morpheus*, eight cross-veins before the radial sector in fore-wing; thirteen branches to radial sector, about 48 costals before stigma; legs rather short, spurs as long as three joints or a little more, last tarsal joint as long as others together. Expanse, 76 mm.

From Los Banos, Philippine Islands (Baker.) Closely related to *F. dirus* (of Ceylon)and *F. morpheus* (which occurs in several Malay Islands, Java, etc.), but abdominal marks will distinguish it at once; the Ceylonese *F. gravis* and the Australian *F. vafer* are also different, and not closely related to *F. dirus*.

Formicaleon disjunctus n. sp.

Dark brown, with paler brown marks. Face below antennæ yellow, tips of antennæ pale, vertex with a transverse row of six rufous spots, the lateral next to eye, the inner pair contiguous; pronotum with a gray median line, not distinct, outer margin blackish, mesothorax with large gray spot behind and a median line in front, and a short gray line on each lateral lobe; metathorax mostly gray above, but with a black mark at inner anterior part of lateral lobes; abdomen with pale transverse spots at base and before middle of several segments; legs pale, tips of last tarsal joint, tip of tibiæ and middle of fore and mid-tibiæ black, black and a few white bristles on legs, many are much longer than width of the joint, femora rather densely clothed with fine white hair. Wings hyaline, veins interrupted black and white, ends of many cross-veins dark, but others wholly pale, base of stigma dark, a dark spot on the cross-vein behind it and on cross-vein beyond; gradates and outer forkings clouded with dark, and a spot at end of anal vein of the fore-wings. Antennæ long and slender; pronotum little longer than broad, and slightly narrowed in front; spurs equal two; tarsal joints. Wings rather slender, acute at tips, six cross-veins in fore-wing before radial sector, 9 branches to radial sector, 5 cross-veins between anal and cubital fork in fore-wings, one such veinlet in the hind-wings; gradates much disjointed, in three series, the anterior a row of 5, behind are two rows one before of four veinlets, and one beyond the anterior row of three veinlets; behind the stigma the cross-veins are almost in even rows. Expanse, 57 mm.

From Los Banos and Mt. Makiling, Philippine Islands (Baker).

ASCALAPHIDÆ.

Suhpalasca princeps Gerst.

One from Los Banos; described from Java.

CHRYSOPIDÆ.

Ancylopteryx 8-punctata Fabr.

Several from Los Banos; common in Malasia.

Ancylopteryx doleschali Brauer.

From Los Banos; known from Amboina.

Nothochrysa inæqualis Walk.

From Los Banos; a common species from India and Insulinde, and redescribed by various writers.

Nothochrysa evanescens McLach.

From Los Banos; one specimen is of the variety *everetti* van der Weele. Recorded from nearby islands.

Chrysopa isolata n. sp.

Wholly pale yellowish green, (probably green when alive) stigma deeper green, a black dot each side at base of clypeus, otherwise unmarked. Pronotum much broader than long, slightly narrowed and rounded in front, transverse groove about in middle. Wings slender, apex acute, venation unmarked, 14 costals before stigma, 3 or 4 inner gradates, 6 to 7 outer ones, the inner series is nearer to outer than to radial sector, and each of inner series is farther from next than its own length, outer marginal forks not twice as long as broad; divisory veinlet ends beyond the cross-vein, second cubital cell about as long as the third, narrowed at tip, but near base about as wide as the third. Hind-wings with two or three very widely separated gradates in inner series, and five or six in outer row; 8 radial cross-veins; in fore-wings 9 or 10 radial cross-veins. Expanse, 22 mm.

Los Banos, Philippine Islands (Baker). Near to *Ch. noumeana* Navas (which I have seen in Paris) but the arrangement of gradates is very different.

Chrysopa tagalica n. sp.

Pale greenish, face yellowish, a yellow median stripe through thorax, antennæ yellow, no marks on head, palpi nor antennæ; wings hyaline, with green venation, stigma rather more distinct. Wings slender, acute at tips, divisory veinlet ends beyond the cross-vein, second cubital cell about as long as the third, both narrowed toward each other, 10 radial cross-veins; in both wings 5 inner gradates and 6 outer, the two series wide apart, the inner much nearer, especially above, to the radial sector than to the outer, and outer much nearer margin than to inner, outer marginal forks about twice as long as broad. Expanse, 22 mm.

From Los Banos, Philippine Islands (Baker).

Probably related to *Ch. ochracea*, (which I have not seen) but latter is darker, with marks on thorax.

Apochrysa bellula n. sp.

Yellowish, head mostly bright red, all over face to clypeus and over anterior part of vertex, not leaving pale around antennæ; basal joint of antennæ faintly brownish in front; pronotum wholly pale; rest of thorax, above, except lateral margin, blackish or dark greenish. Fore-wings with black spot on inner gradates, in fore-wings part of radial sector near stigmal region is black, the inner gradates, three of outer, and the cross-veins beyond the union of medius and cubitus are black; in hind-wings only these latter cross-veins black. The fore-wings are about once and one-half as broad as hind-wings. Expanse, 54 mm.

From Los Banos.

Related to *A. albardæ* but middle area of wing broader, and no spot on outer gradates. From *A. coccinea* it differs in more red on head, no stripe on pronotum, and broader hind wings. *A. aurifera*, is very distinct, and also from *A. albardæ* in that the first black spot is nearer to base of wing.

HEMEROBIIDÆ.

Sisyra bakeri Bks.

From Los Banos; the first record of the genus is Insulinde.

Micromus pusillus Gerst.

From Los Banos; recorded from Java.

Notiobiella affinis Bks.

From Manila.

OSMYLIDÆ.

Spilosmylus modestus Gerst.

Mt. Makiling. Known from Java.

MANTISPIDÆ.

Climaciella luzonensis van der Weele.

Several specimens of this handsome species from Los Banos; described from the Islands.

Mantispa luzonica Navas.

Apparently common at Los Banos.

Euclimacia tagalensis n. sp.

Body rufous throughout, no marks on face, a black band across posterior vertex, the extreme base and apex of antennæ pale yellow, scutelli pale yellow, with the mark extending down on the pleura; a narrow band at base of prothorax black, and dark spots over base of wings; no marks on the abdomen, the anterior femora with faint dark cloud each side near tip. Face irregularly rugose, with short ridges; antennæ short and stout; pronotum short, anterior part very broad, behind the constriction are two roughened tubercles (as in *E. strenua*), and behind these are sulci. Wings long and slender, costal portion embrowned, but not very darkly, fading off behind, broader at base, very faint, but broad at tip. Venation very similar to that of *E. partita* (as figured by Enderlein); costal area very narrow, 11 costals in fore-wing, 9 in hind-wing, 5 cross-veins beyond the stigma; 14 discal cells. Expanse, 36 mm.

From Los Banos, Philippine Islands (Baker).

Mantispa enderleini n. sp.

Similar to *M. amabilis*, but distinguished by the radius being clear yellow out to the stigma. Yellow; a brown stripe from between antennæ down to the mouth; antennæ brown, except the yellow base; a brown spot each side the base of antennæ; pronotum with brown anterior marginal line, some dark spots on the thorax and pleura, abdomen mostly yellow, a black spot at apex of each segment above, broadened out behind, ventral segments margined with dark; legs pale yellow, femur is mostly blackish within, a median brown cloud on the outer side. Wings hyaline; stigma reddish long and slender; venation black, but the radius in both wings is yellow. Base of the median, and the anal vein, also yellow. First radial cell with one branch, second and third each with two branches; cells beyond end of stigma broader than long; six costal cross-veins. Length 10 mm.

From Los Banos, Philippines (Baker).

TRICHOPTERA.

Anisocentropus magnificus Ulmer.

One from Los Banos; described from the Islands.

Notanatolica magna Walk.

From Los Banos; widely distributed in Malasia even from Australia to Japan.

Notanatolica opposita Walk.

Several from Los Banos; not as widespread as *N. magna*.

Œcetinella confluens Ulmer.

From Los Banos: described from Celebes.

Leptocella bakeri n. sp.

Pale whitish yellow; antennæ beyond the basal third marked with brown; wings with a few dark brown patches; two near the base, one at base of discal, and one at base of median cell, one above middle of discal cell, a smaller one at base of stigma, and one at base of each of the apical forks, the first rather the smaller; the anastomosis dark, especially behind; legs and body pale yellowish. Wings slender as usual; the median cell arises about its width before the discal, forks one and three equal, with pedicel one-half as long as the fork, fork five truncate at base, discal cell not drawn up by a cross-vein towards the radius. In hind-wings the costal venation faintly indicated. Expanse, 18 mm.

From Los Banos, Philippine Islands (Baker).

Setodes apicipennis n. sp.

Pale yellowish; basal joints of the antennæ very large, palpi gray haired, rather darker toward tips. Wings pale yellowish, long, slender, acute at tips, costal hairs nearly clear yellow, others dull yellowish; anal area blackish, some black scale-like hairs along the veins; a black spot at stigma, and one below it on the base of fork one; outer margin beyond the stigma around to the opposite side on the hind margin with seven black spots, each at the end of a vein; outer fringe gray, at anal angle very long; hind-wings very slender, hyaline, with long gray fringe, one and one-half times as long as the width of the wing. Legs very slender, pale yellow, tips of tibiæ and the tarsi dark, but in middle legs the last two tarsal joints are white. Expanse, 10 mm.

From Los Banos, Philippine Islands (Baker).

Tagalopsyche n. gen.

Venation very similar to *Setodes*, fore wings with forks 1, 3, and 5, also in hind wings. Spurs 0 (or 1), 2, 2. No spur is visible on the front tibia, but it may have been broken. There are no hairs on the surface of the wing, but the veins have a row of hairs, all pointing the same way. It differs from all Leptocerids in the broadly rounded apical part of fore-wing, and from *Setodes* also in the much broader hind-wings. Maxillary palpi with second, third, and fourth joints very long, the third contracted in middle, all with only a few erect hairs.

Tagalopsyche sisyroides n. sp.

Rich, uniform, dark, chocolate brown. Antennæ pale yellow, beyond a few basal joints the tip of each joint is faintly dark; legs rather pale, but mostly dull brownish, the apical half of the hind tarsi pale, front tibia

pale; abdomen black, short, no distinct appendages, but short processes below and in middle. Fore-wings with a hyaline white dot on the thyridium; hind-wings dark like the fore pair, the posterior fringe quite long and black. Expanse, 11 mm.

From Los Banos, Philippine Islands (Baker).

Dipseudopsis nervosa Brauer.

From Los Banos; described from the Islands.

Dipseudopsis nebulosa Albarda.

Two from Los Banos; known from Sumatra.

Dipseudopsis luctuosa n. sp.

Head reddish yellow, a median vertical black mark on face; vertex with a median black stripe; palpi black; antennæ blackish, except a few basal joints are yellow; pronotum yellow, black on the lower sides and in front; rest of thorax dull blackish; abdomen dark, with apical margins of segments, above and below, pale; legs yellowish, rufous on tips of tibiæ and on the tarsi, front coxæ black. Wings dark brown, with white hyaline spots and streaks as in the figure; a long streak below radial sector, one over bases of third, fourth and fifth apical cells, three elongate spots near anal angle, and streaks in basal part in cubital and median areas. Hind wings dark, but paler near base and in middle of some of the cells. In fore-wing fork I is rather longer than its pedicel, second fork a little back on discal cell, third with a very short pedicel, fourth extends back on median cell about width of that cell, fifth not reaching the cross-vein at base of median cell. Spurs as figured. Expanse, 38 mm.

From Los Banos, Philippine Islands (Baker).

Hydromanicus cinctipennis n. sp.

Body dark, antennæ dark, toward base almost black, serrate within; palpi dark, last joint extremely long; vertex deep black in middle. Wings similar to *H. fasciatus*, with a white band, but general surface is darker than *H. fasciatus*. Venation closely similar to *H. fasciatus*. Distinct from *H. fasciatus* by dark (instead of yellowish) head, thorax, and legs, and rather larger than that species. Expanse, 16 mm.

From Los Banos, Philippine Islands (Baker).

Hydropsychodes costalis n. sp.

Body dark brown, or blackish; antennæ pale, in the female marked with brown in a spiral manner; head and thorax with some golden yellow hair; legs pale, dark at tips of the tibiæ, hind tibia all dark, tarsi mostly dark, leg 1 of male pale. Wings dark brown, darkest along costal area, and here, with three large yellowish spots with irregular margins, one at the stigma

and two before it, another large irregular spot at the anal angle, broken above by dark spots; some connected yellowish spots near base of wing, and a number of small spots in discal part of wing. Hind-wing infuscated, with two paler costal spots, one each side of the stigma. Venation practically the same as *H. kræpelini*, fork I in fore-wings as long as its pedicel, the cross-veins behind base of the median cell not interstitial; in hind-wings fork III is a little longer than in *H. kræpelini*. The lower appendages of male are greatly thickened at tip. Expanse, 10 mm.

From Los Banos, Philippine Islands (Baker).

Ecnopsyche n. gen.

A Hydropsychid, with distinct ocelli, venation of four wings very similar to *Hydropsychodes* and *Ecnomus*, especially in anal veins and short fifth fork, spurs, 2, 4, 4. Fore wings with forks 1, 2, 3, 4, 5; hind wings with forks 2, 3, 5; discal cell in both pairs closed, and in both a cross-vein from discal cell to the radius. Antennæ with long, slender joints; maxillary palpi with joints two and three subequal and fusiform, fourth cylindrical and equal to third, fifth twice as long as the fourth.

This genus, by presence of ocelli, would go in Ulmer's family *Philopotamidæ*, but the venation is very different from any genus therein, and more allied to true *Hydropsyche*. *Stenopsyche* has venation also very different from *Philopotamus*, and so I cannot consider the presence of ocelli as a family character. Likewise Ulmer puts *Ecnomus* in the *Polycentropidæ* because of the 3, 4, 4 spurs, but I agree with McLachlan in considering this genus closely related to *Tinodes*, so that a family, *Polycentropidæ*, based on the spur formula, is to me, an unnatural association, and I prefer to keep the family *Hydropsychidæ* in the old sense, with many small groups based on various characters under it. It may be well here to record the fact that the *Hydropsychidæ* differ from other caddice flies in lacking bristles on the dorsum of the thorax, fine hair only being present.

Ecnopsyche reticulata n. sp.

Yellowish; antennæ very faintly darker at tips; vertex with rather sparse golden hair; wings pale yellowish, reticulate with pale brown, which forms many bands connecting the veins, rather dark at anastomosis, on the outer margin. The wing is pale brown, with many small hyaline spots, indistinct dark spots at the ends of the veins; venation yellowish; hind-wings hyaline, venation yellowish, especially near the costa. Legs pale yellow, very slender, spurs more rufous; abdomen dull black, genitalia yellowish. Lower appendages of male no larger at tip than at the base, the apical joint very slender. Expanse, 15 mm.

From Los Banos, Philippine Islands (Baker).

Polycentropus sp.

One from Los Banos; may not belong to genus in restricted sense.

Chimarrha luzonica n. sp.

Head yellowish, antennæ pale yellowish, palpi dark brown, erect hair each side on vertex; thorax and abdomen dark, legs pale yellowish, but the spurs dark brown; wings gray blackish, nearly uniform, with sparse black hairs, veins darker; hind wings colored like fore wings, fringe black at tip, gray behind, fork 3 of hind-wings with a very long pedicel, fully twice as long as the fork; discal cell of fore wings rectangular, anal veins separate at ends. Expanse, 10 mm.

From Los Banos, Philippine Islands.

EXPLANATION OF PLATES.

Fig. 1. *Chrysopa isolata*, cubital cells.
Fig. 2. *Tagalopsyche sisyroides*, wings.
Fig. 3. *Dipseudopsis luctuosa*, wing, and spur.
Fig. 4. *Dinarthrodes niger*, male appendage.
Fig. 5. *Dinarthrodes niger*, head and antenna.
Fig. 6. *Echnopsyche reticulata*, wings.
Fig. 7. *Tagalopsyche sisyroides*, palpus and genitalia.
Fig. 8. *Chimarrha luzonica*, fore wing.
Fig. 9. *Hydromanicus cinctipennis*, genitalia.
Fig. 10. *Neoperla recta*, head and part of wing.
Fig. 11. *Echnopsyche reticulata*, genitalia.
Fig. 12. *Neoperla obliqua*, head.
Fig. 13. *Dinarthrodes niger*, fore wing.
Fig. 14. *Hydropsychodes costalis*, genitalia.
Fig. 15. *Leptocella bakeri*, genitalia.
Fig. 16. *Chrysopa tagalica*, cubital cells.
Fig. 17. *Neoperla obliqua*, part of wing.

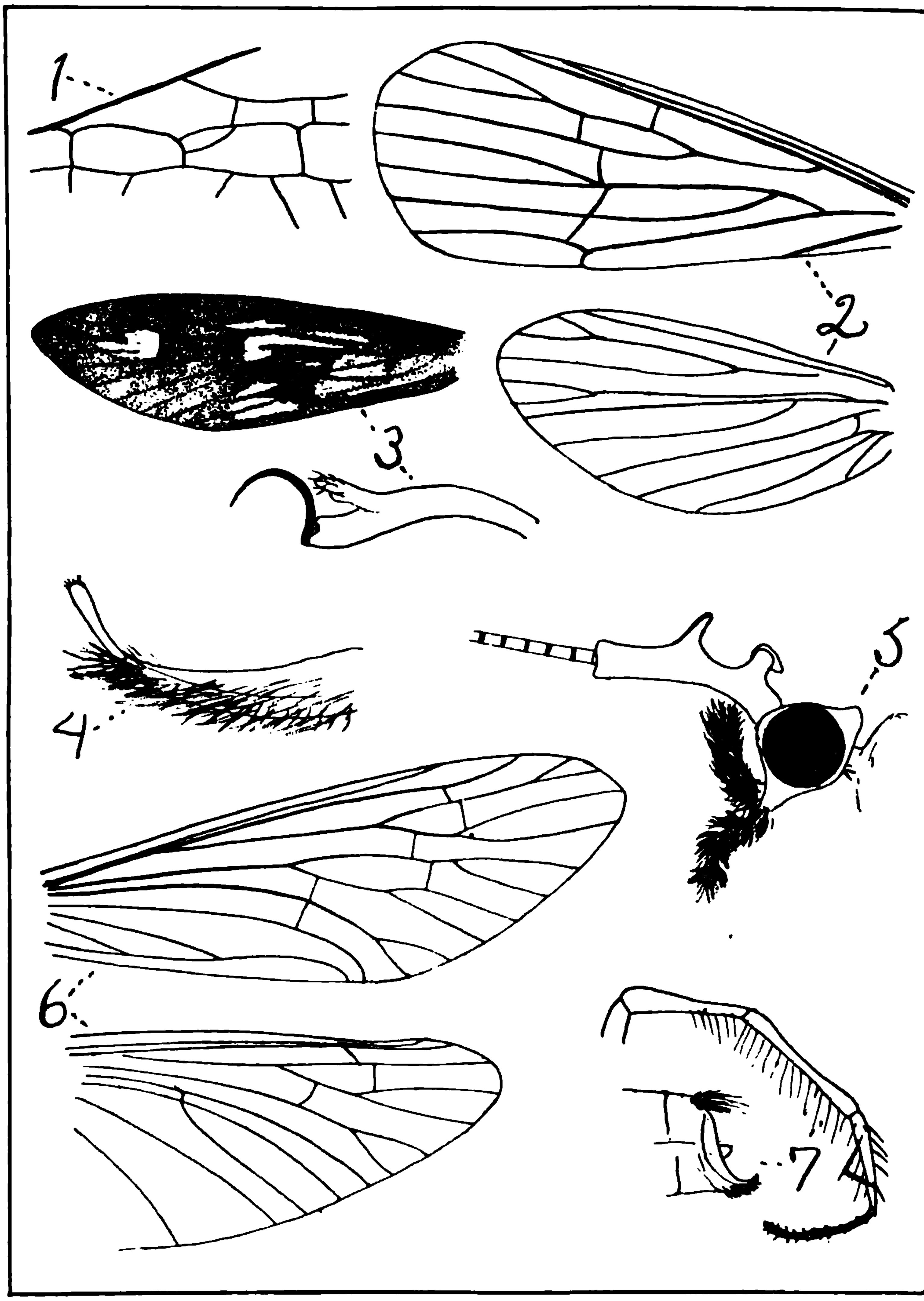
DESCRIPTIONS OF NEW PARASITIC HYMENOPTERA.

By S. A. Rohwer, *Bureau of Entomology*.

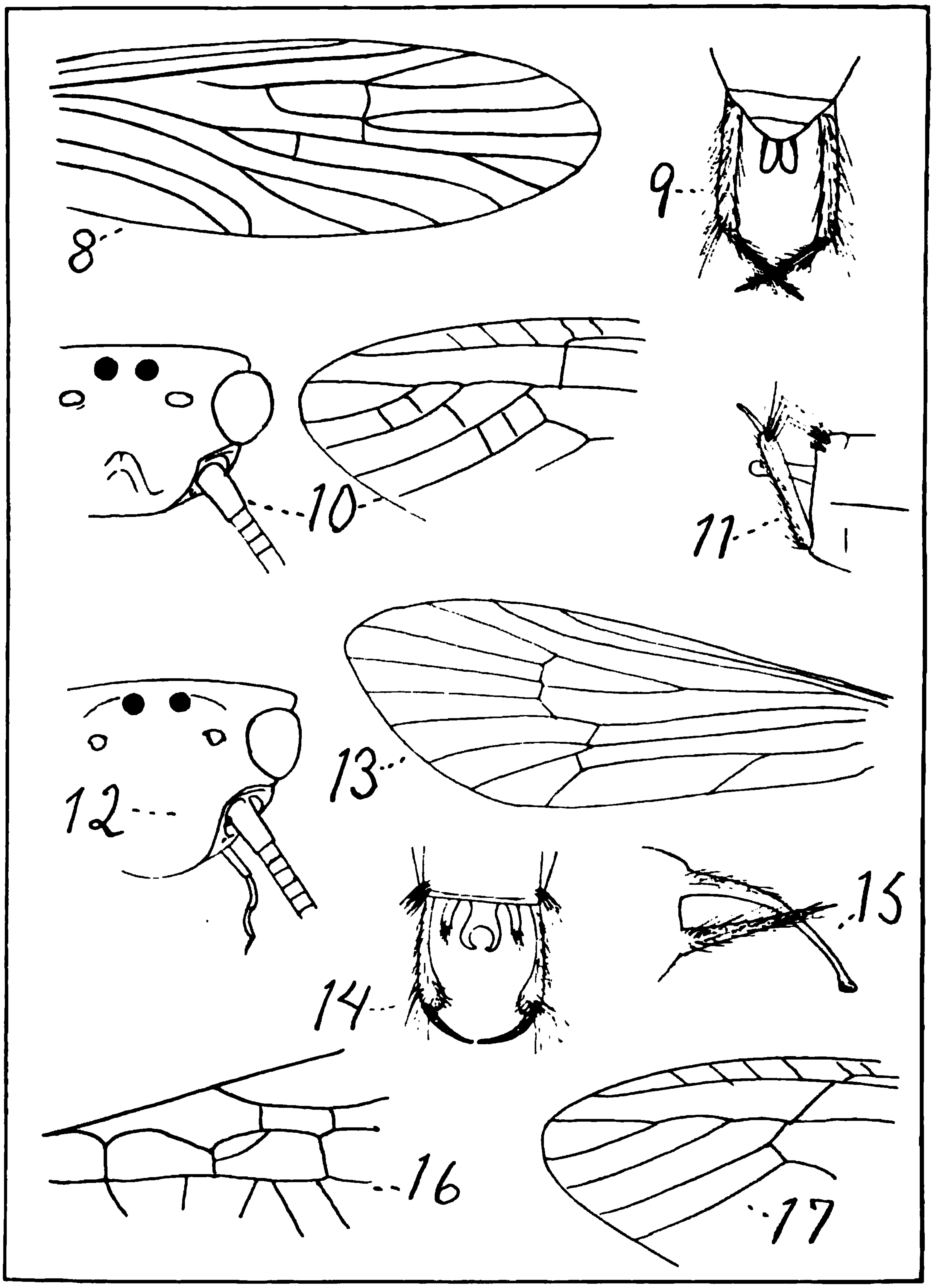
The following miscellaneous descriptions of new parasitic Hymenoptera are presented at the present time so that the names of certain species which have proven to be of economic importance in controlling forest insects and other injurious insects will be made available for discussion in economic papers.

Ichneumon brunneri, n. sp.

Seems to belong to the group of *Barichneumon* and runs there in Ashmead's table of the genera, but Morley says that this group



CHARACTERS OF NEUROPTEROID INSECTS FROM PHILIPPINES.



CHARACTERS OF NEUROPTEROID INSECTS FROM PHILIPPINES.

has the post-petiole punctured centrally, which is not the case with our species. In Cresson's synopsis of American Ichneumons this runs near *cæruleus* but the black scutellum and other color characters will readily separate it from that species.

Female. Length, 11 mm. Anterior margin of the clypeus produced into a low, obtusely triangular, median tooth; supraclypeal foveæ punctiform, deep; the median basal portion of the supraclypeal area convex, separated from the bases of the antennæ by a distinct carina; anterior ocellus in a broad, shallow depression; postocellar line one-third longer than the ocell-ocular line; flagellum filiform, first joint slightly longer than the second; face and front with distinct well defined separate punctures; vertex and posterior orbits nearly impunctate; mesoscutum granular with dense setigerous punctures; scutellum more sparsely punctured than the scutum; mesepisternum punctured similarly to the scutellum; sides of the propodeum sculptured like the mesepisternum; posterior aspect of the propodeum with large, confluent, close, punctures; basal lateral area with rather large distinct punctures; areola, basal lateral area and basal area almost impunc-

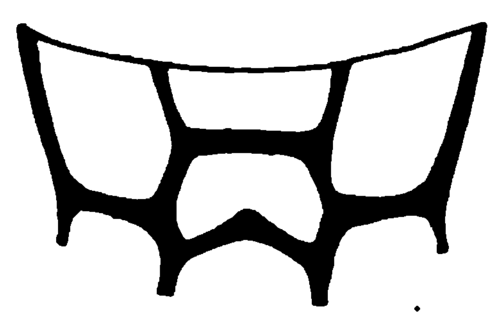


Fig. 1. Areolation of the propodeum of *Ichneuman brunneri.*

tate; areolation as in figure 1; the central portion of the post-petiole finely, longitudinally aciculate; gastrocoeli well defined; basal portion of the second tergite longitudinally striate, the remaining portion longitudinally striato-punctate; the base of the third and fourth segments striato-punctate, the remining portion sparsely punctured, following segments practically impunctate; apical sternite truncate apically; empodia large, well defined, median portion membranous; legs normal; areolet pentagonal. Dark blue black; inner margin of the eyes almost to the vertex, spot at the summit of the eye, posterior margin of the eye, lateral margin of the dorsal posterior margin of the pronotum, top of mesepisternum, an incomplete annulus on the ninth, tenth, eleventh and twelfth joints of the flagellum and anterior tibiæ beneath, *white*; wings hyaline, venation black.

Male. Agrees well with above description of female except in the following points: The antennæ are somewhat antenniform; the clypeus is nearly truncate; and the color differs as follows: Mandibles except apices, clypeus, face marks produced inwardly so they meet, just below the antennæ, scape beneath, base of the anterior tarsus, base of the four posterior tibiæ, and the base of the four posterior basitarsi, *white*.

Missoula, Montana. Described from one male and one female recorded under Bureau of Entomology Number Hopk. U. S. 11526. Material collected January, 1913, and reared by Joseph Brunner, for whom the species is named. The female is the type.

Type: Cat. No. 16032, U.S.N.M.

Itoplectis plesia, n. sp.

Judging from the description this resembles *Pimpla behrensi* Cresson, but may be separated from that by the shorter ovipositor and in not having the apical margin of the tergites yellow.

Female. Length, 9 mm.; length of ovipositor 5 mm. Apical margin of the clypeus straight; front with the distinct, well defined, separate punctures, which become more widely separated towards the inner margins of the eyes; seen from the side, the entire front is gently convex; the antennal foveæ sharply defined below; area immediately below and between the antennæ depressed into a V-shaped fovea, the apex of the V being ventral; the distance between the eyes at the vertex slightly less than the distance between them at the clypeus; the emargination is broad; head above the antennæ and the posterior orbits shining, practically impunctate, straight above the inner bases of the antennæ; ocellocular line subequal with the width of the lateral ocellus; third antennal joint but little shorter than the fourth and fifth combined; mesoscutum shining with widely separated setigerous punctures; mesepisternum similarly sculptured; scutellum and propodeum similarly sculptured; dorsal aspect of the propodeum with two well defined diverging carinæ which extend to where the sloping posterior face begins; first tergite with sparse well defined punctures except the median apical area which is practically impunctate; the second tergite with large, sometimes confluent punctures except the apical margin which is practically impunctate; basal margin with two elongate foveæ, just before the apical margin depressed, the depression broader laterally; the third tergite similar to the second except there is no fovea basally; the fourth tergite similar to the third but not quite so densely punctured; the fifth and following tergites with sparse punctures. Black; tegulae white; legs below the coxæ rufo-ferruginous; the intermediate tibiæ annulated at the base with black, and below the black annulation is a white annulation; posterior tibiæ and tarsi black, the tibiæ with a white annulation at the basal third, the base of the first and second tarsal joints white; calcaria white; the intermediate tarsi have the two basal joints white at the base; wings hyaline iridescent, venation black.

Camas, Montana. Described from one female recorded under Bureau of Entolomogy Number Hopk. U. S. 11528. Material collected, January, 1913, and reared by Joseph Brunner.

Type: Cat. No. 17063, U.S.N.M.

Stilbopoides n. genus.

The inner margin of the eyes not emarginate, slightly converging towards the vertex; clypeus well separated from the front, the anterior margin rounded; mandibles bidentate; malar space a little shorter than the length of the scape; antennæ of the female thickened apically with the apical joint elongate and slightly longer than the two preceding it; antennæ of the male simple, almost as long as the body; front slightly convex; propodeum exareolate, posterior face separated from the dorsal aspect by strong carina; spiracles circular in outline; anterior wings with an areola; nervulus well beyond the basal vein; nervellus broken slightly below the middle; claws apparently simple but seen magnified 35 dianeters, finely pectinate; apical joint of the hind tarsi not quite twice the length of the preceding one; first, second and third tergites transversely depressed apically; abdomen coarsely punctured.

In Schmiedeknecht's classification this genus runs to *Cnemopimpla* Cameron, but differs in a number of points from the original description of Cameron's genus. The eyes are not sinulate on the inner margin and the areola is triangular, as well as other characters. In Ashmead's classification this runs to *Stilbops* Förster, but the exareolate propodeum will readily separate this from *Stilbops*.

Type: Stilbopoides maculiventris, n. sp.

Stilbopoides maculiventris, n. sp.

Female. Length, 10 mm. Head polished, rather densely punctured, posterior orbits shining, practically impunctate; postocellar line about twice as long as the ocellocular line; first joint of the flagellum distinctly longer than the second; the scutum, scutellum, and episternum shining, with small well separated punctures; propodeum closely, sometimes confluently punctured with the carina separating the two faces, slightly curved in the dorsal middle; first abdominal segment shining with close well defined punctures laterally, and along the apical transverse furrow striato-punctate; second and third tergites similarly punctured except the punctuation tends to a transverse striato-puncturation; fourth and following tergites finely reticulate, shining. Black; spot on the clypeus orange yellow; spot on the mandibles, tegulæ, posterior margin of the pronotum, apices of the coxæ beneath, anterior trochanters beneath, sternites, except spots laterally, white; sides of the scutum, scutellum, most of the mesepisternum, mesosternum, dark rufous; legs rufo-testaceous, except where mentioned, and the dark brown posterior tibiæ and tarsi; wings hyaline, iridescent, venation black.

Male. Length, 10 mm. Disregarding the sexual characters, the male agrees well with the female except that there is no rufous on the thorax and the apices of the posterior femora are black; first joint of the flagellum slightly longer than the second; posterior ocelli prominent; cochlearium,

seen laterally broad basally, dorsal margin straight for half its distance then tapering rapidly to the obtuse apex; the ventral margin straight, deeply sinulate at the apical third.

Missoula, Montana. Described from two females (one type) and two males recorded under Bureau of Entomology number Hopk. U. S. 11504b. Material collected, January, 1913, and reared by Joseph Brunner.

Type: Cat. No. 15385 U.S.N.M.

Stilbopoides sesiavora, n. sp.

Differs from *Stilbopoides maculiventris* Rohwer in the longer first tergite, in the lack of a median depression on the basal portion of the first tergite, in the narrower, smooth apical margins of the first, second and third tergites, and in the slightly different color.

Female. Length, 12 mm. Clypeus with the apical portion smooth, apical margin truncate the basal portion sculptured as the front; the lateral supraclypeal areas shining, very finely punctured; the median supraclypeal area mound shaped, with distinct, fine, separated punctures; head above the antennæ shining, very sparsely punctured; laterad of each lateral ocellus is an elongate fovea; postocellar line one-third longer than the ocellocular line; scape strongly dilated; third antennal joint slightly longer than the fourth; mesoscutum with distinct well defined separate punctures; scutellum with punctures more widely separated; mesepisternum shining, very sparsely punctured, especially posteriorly; propodeum truncate posteriorly; the posterior aspect separated from the dorsal aspect by a well defined carina; posterior and lateral aspects shining, with sparse, well defined, rather large punctures; the median area shining and more or less U-shaped; the posterior face very sparsely sculptured with distinct well defined punctures, in outline semicircular; first tergite about one-third longer than the apical width, the posterior median portion with a distinct depression, punctured similarly to the dorsal aspect of the propodeum except posteriorly they become closer; the median apical margin of the first tergite shining, impunctate; second tergite sculptured about as the densest portion of the first tergite; its puncturation becomes denser posteriorly, its apical margin with a narrow, shining, impunctate band; third tergite uniformly sculptured like the posterior portion of the second tergite; it also has a narrow, shining, impunctate band; fourth tergite sculptured as the third tergite except that the apical margin before the shining, impunctate band is depressed into a furrow which is interrupted medianly; fifth tergite with poorly defined punctures; the following tergites practically impunctate with the surface finely granular; venation and legs as in *maculiventris*. Black; mandibles except apices, apical portion of the clypeus, anterior superior orbits, lateral anterior stripes on the mesoscutum, tegulæ,

a spot before and beneath and a spot in front of intermediate coxæ, *white;* legs rufo-ferruginous; the anterior coxæ and trochanters beneath, the bases of all the tibiæ white; the posterior tibiæ and tarsi to the extreme apices of the posterior femora black; membrane of the sternites white with black maculations laterally; wings hyaline, faintly dusky; venation black.

Male. Length, 10 mm. Agrees well with the above description of the female but for the usual sexual characters, and in having the clypeus entirely, the inner orbits to vertex, and two spots extending from the clypeus to the bases of the antennæ and an elongate spot on the mesepisternum below, *white.*

Winchester, Virginia. described from three females (one type) and one male recorded under Bureau of Entomology Number Quaintance 10401. Specimens reared by E. B. Blakesley, April 20, 1913, from *Sesia pyri.*

Type Cat. No. 16854, U.S.N.M.

Genus Helcostizus Foerster.

Syn. *Asternaulax* Viereck, Proc. U. S. Nat. Mus. vol. 42, 1912, p. 632.

A comparison between *Asternaulax fiskei* Viereck and *Helcostizus brachycentrus* (Gravenhorst) revealed no generic differences. The writer is of the opinion that Ashmead was correct in placing *Helcostizus* in the *Xoridini.* To him the habitus is *Xoridini* not *Phygadonini,* where Schmiedeknecht places it, and the complete absence of sternauli would also remove it from *Cryptinæ.* As far as the American species of *Echthurus* Gravenhorst are concerned he is of the opinion that they should be placed in the subfamily *Cryptinæ* as they all have sternauli. In other words the Pimplinæ includes genera in which the sternauli are wanting.

Helcostizidea, n. genus.

Cubocephalus Ashmead (nec Ratzeburg) Proc. U. S. Nat. Mus. vol. 23, 1910, p. 61.

This genus has somewhat the habitus of some of the *Cryptini,* but differs from all *Cryptini* in the absence of the sternauli. It resembles them however, in that the spiracles on the first tergite are placed slightly beyond the middle.

Head, seen from above, quadrate or nearly so; temples broad; malar space as long or nearly as long as diameter of the eye, mandibles short, bidentate apically; apical margin of the clypeus depressed; scape strongly convex dorsally, straight ventrally, longer on the dorsal line than on the ventral line; prepectus represented by faint carinæ; sternauli obsolete; scutum without furrows; propodeum areolate, the areola sometimes con-

fluent with the basal area, though usually separated from it by a transverse carina; areolet triangular; nervulus and basal vein interstitial or nearly so; discal-cubital vein not broken by stump; nervellus broken well below the middle; first abdominal segment petiolate, the spiracles placed slightly beyond the middle; abdomen of the female slightly compressed apically; legs robust; calcaria short; tarsal claws with an erect median tooth, and with small teeth basally.

Type: Cubocephalus atrocoxalis Ashmead.

Related to *Helcostizus* Foerster but separated from it by the well defined areola. *Cubocephalus* Ratzeburg has sternauli and belongs to the Cryptinæ.

Helcostizidea xanthognatha, n. sp.

This species resembles *atrocoxalis* (Ashmead), but may be separated from it by the posterior legs of the areola being much shorter than the anterior legs.

Female. Length to the apex of the abdomen, 14 mm. Antennæ filiform; head finely granular; the area immediately above the antennæ depressed, the depression extending ventrally from the anterior ocellus; the intra-ocellar area divided by short, longitudinal furrow; posterior ocelli bound posteriorly and laterally by a deep furrow; postocellar line distinctly longer than the ocellocular line which is about twice the diameter of the lateral ocellus; scutum shining, very sparsely punctured, although anteriorly the punctures are closer and become subopaque; scutellum convex, sculptured similarly to the scutum; the suture separating the scutellum and scutum foveolate; lateral posterior margin of the pronotum reticulate; the upper margin of the mesepisternum obliquely striate, the remaining portion punctate on a finely granular surface; suture between the meso- and meta-thorax strongly foveolate; sides of the propodeum sculptured like the mesepisternum; dorsal aspect of the propodeum finely granular; basal area almost parallel-sided, although anteriorly the carinæ diverge, separated from the areola by a poorly defined transverse carina; areola slightly longer than wide posterior parallel legs about two-thirds the length of the anterior diverging legs; surface of the areola and the posterior face of the propodeum transversely striate; abdomen finely granular except the apex and the first tergite which is impunctate; tibiæ with minute spines and short hair. Black; palpi, mandibles except apices and tegulæ, yellowish white; four anterior legs below coxæ, posterior trochanters and the posterior femora rufous, or rufo-ferruginous; the intermediate tarsi dusky; wings hyaline, venation brown; costa and stigma dark brown.

Columbia Falls, Montana. Described from one female recorded under Bureau of Entomology Number Hopk. U. S. 8530a, material collected by Joseph Brunner.

Type: Cat. No. 16047 U.S.N.M.

Apanteles (Pseudapanteles) nigripes, n. sp.

This species is related to *Apanteles* (*Pseudapanteles*) *cloreuti* Viereck, from which it may be readily separated by its black legs.

Male. Length, 1.25 mm. Eyes slightly converging towards the clypeus; head below the antennæ shining, sparsely punctured, with a low median hump just above the clypeus; above the antennæ the head is shining, and without well defined punctures; mesonotum opaque with separate well defined punctures; suture between the scutum and scutellum foveolate; scutellum shining, practically impunctate; propodeum opaque with well defined punctures; mesepisternum shining, practically impunctate; sides of the propodeum shining, practically impunctate; first tergite with its length and width subequal, rather coarsely reticulate; second tergite rectangular in outline, about four times as wide as long, and sculptured like the first tergite, but in addition has a faint median carina; the third and following tergites shining, almost impunctate. Entirely black; wings hyaline, slightly iridescent, venation very pale brown.

Falls Church, Virginia. Described from one male recorded under Bureau of Entomology Number Hopk. U. S. 11171d, material collected and reared, July 22, 1913, by Carl Heinrich.
Type: Cat. No. 16472, U.S.N.M.

Campyloneurus busckii, n. sp.

The remarks under *Monogonogastra wolcottii* Rohwer apply to this species as far as its published allies are concerned.

Female. Length, 12 mm.; length of the ovipositor, 12 mm. Antennæ reaching to about the apex of the third tergite; head shining, depressed bebetween the antennæ and the ocelli; the ocelli surrounded by deep, well defined furrow which extends ventrally from the anterior ocellus to between the bases of the antennæ; postocellar line about one-fifth shorter than the ocellocular line; thorax shining, polished; scutellum very little higher than the scutum; embossed median area of the first tergite elongate, much broader posteriorly, defined laterally by a broad depression which is transversely foveolate; embossed area of the second tergite triangular in general outline, but about the apical third narrows into a line and from there on is defined laterally by a broad, shallow, irregularly foveolate depression; suture-formed articulations foveolate; third tergite with a poorly defined embossed median area; laterally this area is defined by a shallow, punctiform depression; tergites shining, impunctate; last sternite extending about the width of the posterior tibiæ beyond the apex of the abdomen. Dark rufo-ferruginous; head except the trophi, antennæ and sheath, black; head and thorax clothed with long, sparse, pale yellowish hair; wings basad of the basal vein yellowish hyaline, the rest dark brown except a transverse yellowish band beneath the stigma; venation dark brown; stigma light yellow.

Male. Length, 12 mm. Barring sexual characters this agrees with the above description of the female.

Trinidad, West Indies. Described from one male (allotype) and one female (type) collected in June by August Busck, for whom the species is named. One paratype collected at Trinidad, March 20, 1913, by T. W. Urich and G. N. Wolcott.

Type: Cat. No. 16021 U.S.N.M.

NOTES ON RHIPIDANDRI (COLEOPTERA).

By H. S. Barber, *Bureau of Entomology*.

In arranging the National Museum specimens of *Rhipidandrus* a number of obstacles were encountered, and it is thought that the following notes may be of use to someone.

Much confusion has resulted from the assignment of the group to different families. In fact, as Mr. Arrow has pointed out (see below, 1904) three species have been described as Scolytids, one (possibly two) as Scarabæids, and one as a Ptinid, while the discussion is still open as to their assignment in the Tenebrionidæ, or in the Cioidæ.

The figure and description of the *Melolontha paradoxa* of Palisot de Beauvois are very unsatisfactory, and it is hard to accept Sallé's statement (see LeConte, 1873) that it is the *Xyletinus flabellicornis* of Sturm. Nevertheless Sallé may have seen the type of the former, and it would be unsafe to repudiate the well-known combination (although omitted in Junk's Catalogus) without further data. Mr. Schwarz and the writer have attempted to associate Beauvois' name with some other South Carolinian beetle, but have failed. The description differs from our *Rhipidandrus* in color, shape of thorax, and sculpture, and from the figure in size, form of posterior part of body, tarsi and antennæ. It is difficult to know where to stop in allowing for error.

In almost a century that the group has been known in technical literature, there has been but one comprehensive article. This one appeared only nine years ago (1904) and does not mention either of our United States species, although it draws together the species that had been misplaced in other families. The contributions to our knowledge of the group, arranged chronologically, but not including various local lists, are as follows:

1805–1821 Palisot de Beauvois (Ins. rec. Afr. et Amer. p. 173. pl. IV. b. fig. 1) describes *Melolontha? paradoxa* from South Carolina (collected by Bosc) as a species placed in this genus with great uncertainty.

1826 Sturm (Catalogue p. 59. t. 1. fig. 7) figures the North American *flabellicornis* (work not seen by the writer—citation taken from literature).

1843 Sturm (Cat. Kafer Sammlung. p. 84) includes *flabellicornis* among the species of *Xyletinus* and cites his previous figure (1826.)

1853 Melsheimer (Cat. Coleop. U. S. p. 86) cites *flabellicornis* Sturm under *Xyletinus.*

1854 LeConte (Proc. Acad. Sci. Phil. 1854. p. 218) removes *Xyletinus flabellicornis* Sturm from the Ptinidæ but can give no indication where it should be placed.

1858 Motschulski (Etud. Ent. VII. p. 64) describes *Xyleborus? crenipennis* from Burma and mentions its resemblance to *Hylurgus* and *Hylastes.*

1862 LeConte (Classif. Coleop. N. A. pt. 1. p. 236) included *Rhipidandrus* (*Xyletinus*) *flabellicornis* Sturm in the Tenebrionidæ as forming Group II. Rhipidandri in the tribe Boletophagini. This is the first characterization of the genus.

1863 LeConte (List. Coleop. N.A. p. 62) lists *Rhipidandrus* (*Xyletinus*) *flabellicornis* in the Boletophagini.

1866 Lacordaire (Genera des Coleop. vol. VII. p. 369) describes *Eutomus,* a new genus in the Scolytidæ and includes two new species, *E. micrographus* the type from Cayenne and Columbia, and *E. madagascarensis.*

1870 Horn (Revis. Tenebr.—Tr. Amer. Philos. Sc. XIV. p. 389) includes *Rhipidandrus flabellicornis* (Sturm) in the Tenebrionidæ with *Eledona.*

1870 Gemminger and Harold (Cat. vol. 7. p. 1946) places *Rhipidandrus flabellicornis* Sturm in the Tenebrionidæ next to *Boletophagus* and notes its removal from *Xyletinus* where the species had been included in the preceding volume (1869) p. 1779.

1872 Gemminger and Harold (Cat. vol. IX. p. 2678) include both of Lacordaire's species of *Eutomus* as he had placed them in the Scolytidæ, and *crenipennis* Mots. (1 c. p. 2685) still appears as a species of *Xyleborus.*

1873 LeConte (Proc. Acad. Nat. Sci. Phil. p. 329 and 335) says "*Melolontha paradoxa* Beauv., according to Sallé, is *Rhipidandrus flabellicornis* (Sturm).

1873 Crotch (Check List Coleop. Am. N. of of Mex. p. 108) lists *Rhipidandrus paradoxus* (Beauv.) with *flabellicornis* (St.) as a synonym in the Tenebrionidae.

1878 Schwarz (Proc. Am. Philos. Soc. XVII. p. 462) lists *Rhipidandrus paradoxus* Beauv., with Tenebrionidæ from Enterprise, Fla.—"rare on fungi."

1882 Horn (Bull. Soc. Ent. Fr. (6) vol. 2. p. CXXXII) gives the sexual differences of *Eutomus micrographus* Lac., and states that the genus is a synonym of *Rhipidandrus* Lec. (1862), being in no sense a Scolytid.

1883 FRIEDENREICH (Stett. Ent. Zeit. 44 pp. 375–379) erects a new genus *Heptaphylla* in the Lamellicornia for *H. fungicola*, n.sp., from South Brazil, and described its larva. (See Arrow, 1904).

1883 LECONTE and HORN (Classif. Coleop. p. 232) includes *Rhipidandrus* in the Cioidæ and mentions *Eutomus* as a synonym.

1885 HENSHAW (List Coleop. p. 86) drops the synonymy and lists *R. paradoxus* Beauv., in the Cioidæ.

1886 DE BORRE (Ann. Soc. Ent. Belg. 30. p. 56) erects a new subtribe in the *Trogini*, the *Heptaphyllini* for *Heptaphylea fungicola* Fried. (See Arrow, 1904.)

1889 FLEUTIAUX et SALLÉ (Ann. Soc. Ent. Fr. 1889. p. 420) mistook the date of LeConte's genus *Rhipidandrus*, and so made it a synonym of *Eutomus* Lacordaire (1866). They discuss the position of the genus citing Horn's note (1882) and agree that it belongs in the Cisidæ. Lacordaire's species *micographus*, is recorded from Guadeloupe (probably wrongly identified).

1894 WATERHOUSE (Ann. Mag. Nat. Hist. (6) 14 p. 68) describes a new genus of Cioidæ containing two new species *Cherostus walkeri* (type) from Damma Isl. and *C. simpsoni* from Australia. The genus is compared with *Eutomus* but no species of the latter genus is mentioned.

1894 HORN (Proc. Calif. Acad. Sci. (2) vol. IV. p. 392) describes *Rh. peninsularis* n.sp., from Lower California, and, apparently forgetting his note of 1882 compares it to the Scolytid genus *Eutomus*.

1895 HENSHAW (3d Supp. List. Coleop. p. 21) lists *R. peninsularis* Horn.

1898 GORHAM (Proc. Zool. Soc. Lond. 1898. p. 333) describes a new species (*Eutomus sulcatus*) from St. Vincent, and records Lacordaire's type species of *Eutomus* (probably wrongly determined) from St. Vincent, Grenada, and Guadeloupe, figuring the species on pl. XXVII, fig. 4).

1904 ARROW (Ann. Mag. Nat. Hist. (7) vol. 14. p. 20–33) corrects some strange errors of classification, and synonymy, and describes two new species (*Cherostus cornutus* from St. Vincent and Grenada, and *jamaicensis* from Kingston.) He removes *Heptaphylla fungicola* Fried. from the Lamellicornia (Trogidæ) to the genus *Rhipidandrus* and accepts *Eutomus* Lac. as a synonym of the same genus, correcting the error in date of publication made by Fleutiaux and Sallé. In his discussion of the species of *Cherostus* Waterh., he removes the *Xyleborus crenipennis* of Motschulski 1858 (from Burma, Ceylon? and the Andaman Islands) and after remarks about sexual characters and a review of the larval characters as described by Friedenreich for *Rhipidandrus* (*Heptaphylla*) *fungicola*, he doubtfully indicates the relationship of the group with the lignivorus *Malacodermata*.

1905 SHARP (Biol. C. A. Coleop. vol. 2, pt. 1. p. 690–692) describes two new species (*Rh. mexicanus* and *championi*) and records a third species

Cherostus cornutus (probably in error)[1] from Oaxaca and Durango. He contends that the resemblance to *Eledona* is not deceptive but genuine, and refers the group again to the Tenebrionidæ as an aberrant group allied to the Boletophagini.

1910 BLATCHLEY (Coleop. of Indiana p. 901) includes *Rh. paradoxus* in the Cioidæ and gives sexual differences in the antennæ, but records its occurrence under bark of oak stumps, rare.

1911 GEBIEN (Coleop. Cat. Tenebrionidæ III. p. 362) lists six species of *Rhipidandrus*, five species of *Cherostus* and three species of *Eledona* as forming the *Rhipidandrini*, but he omits two species viz. *peninsularis* Horn 1894 and *sulcatus* Gorham 1898, and does not refer to *paradoxus* (Beauv.). The latter appears as *flabellicornis* Sturm, a name that has been replaced (perhaps wrongly) by Beauvois' name for forty years in the American literature.

Although the generic nomenclature appears simple, the writer believes that an error has been made in accepting Lacordaire's generic name *Eutomus* as a synonym of LeConte's genus. The former's type species is unknown to the writer but its description seems to apply to a species more nearly resembling *Cherostus cornutus* Arrow (which was formerly recorded as *micrographus* Lac.) than to LeConte's genus *Rhipidandrus*. The erection of *Cherostus* by Waterhouse for two oriental species may be justified, but the American species are believed to belong in *Eutomus*.

In regard to the biology, we have only the description of the larvae by Friedenreich (1883) translated by Arrow (1904), and numerous statements that they are found in hard woody fungi. In the experience of Mr. Schwarz and the writer *Eutomus* is usually in company with a brown species of *Arrhenoplita*.

From the following six species, represented in the National Collection, it appears that *Rhipidandrus*, type *flabellicornis* (Sturm. 1826) Lec. 1862, has the antennal rami produced into flabellæ, and is devoid of frontal sexual characters, while in *Eutomus*, type *micrographus* Lac., 1866, the antennal rami are much shorter, so that when closely appressed the antennæ appear clavate and not flabellate, and the frontal sexual characters consist of a pair of clypeal tubercles in the male and a more or less pilose frontal concavity in the female. No oriental species of this group are before the writer, but since Arrow (1904) adopted Waterhouse's genus *Cherostus*, type *walkeri* Waterh. 1894, for his West Indian species, here called *Eutomus cornutus*, it is believed that the former genus will fall as a synonym of the latter.

[1] There is great probability that this is identical with Horn's *Rh. peninsularis* but not with Arrow's *Ch. cornutus* from the West Indies.

Rhipidandrus paradoxa (Beauv.) 1805?

flabellicornis (Sturm.) 1826.

About thirty specimens from the following localities: *Can.*; *Mich.*, Grand Ledge, Detroit; *Kans.*; *Md.*; *D.C.*; *Ky.*, Louisville: *Ga.*, St. Catherine Island; *Fla.*, Crescent City; *La.*, Covington; *Tex.*, Columbus.

No differences in extent of antennal flabellation that might indicate sexes have been noticed in the set, although Blatchley (1910) has alluded to such a difference. The figure and description of *Melolontha paradoxa* by Beauvois are so grossly different from our specimens that it is hard to accept Sallé's statement to LeConte (1873).

?Rhipidandrus championi Sharp 1905.

Two examples from dry fungus at Alhajuela, Canal Zone, Panama, in April, 1911, by August Busck, are much smaller, narrower, and more cylindrical than the preceding, and are remarkable in the clypeus being strongly tumid, highly polished, and of a light reddish brown color, while the antennæ are much less strongly ramose than in *flabellicornis* and more strongly so than in *Eutomus* (*Cherostus*). Length. 1.8 mm., width 0.74 mm.

?Rhipidandrus (Eutomus) sulcatus (Gorham) 1898.

Three specimens from Cayamas, Cuba, and two from Santo Domingo are similar to *flabellicornis* but are more cylindrical, have a relatively larger head with finer punctation. The antennæ are hardly different from *flabellicornis.*

?Eutomus cornutus (Arrow) 1904.

A large set (about fifty) from Montserratt, W.I. (H. G. Hubbard), and a few from Santo Domingo appear specifically inseparable, and are doubtfully referred to this name. If *jamaicensis* (Arrow 1904) proves to be but a small individual of this species its range would appear to extend throughout the West Indies.

?Eutomus peninsularis (Horn) 1894.

A set of about five hundred specimens was collected by the writer at Brownsville, Texas, May 7, 1904, in a hard brown fungus.[2] Horn's species came from Lower California and no typical material has been seen. A single male from San Diego, Texas, and three specimens (2 males and 1 female) from Tampico, Mexico,

[2] This fungus was determined for me as *Ganoderma pseudoboletus* but I now believe the determination is incorrect.

December 27, 1909, collected by E. A. Schwarz are probably the same species. They are similar to *cornutus*? but are smaller, lighter brown with much paler antennæ, and the males are much shorter than the females.

Eutomus panamaensis n.sp.

Very dark brown, legs reddish, antennae testaceus, sides parallel, body less than twice as long as wide. Head and pronotum alutaceous, or finely reticulate, the ridges shining, the intervals opaque except for a minute polished point in the center of each area; pronotum five-ninths as long as wide. Elytra shining, strongly sulcate, the intervals becoming costæ on each side of which are faint rugosities, and very minute hairs, each pointing obliquely towards the ridge. Length, 3 to 3.5 mm.

Male.—Clypeus with two obtuse horns which are separated by two-sevenths of the interocular space.

Female.—Clypeus tumid, median third smooth, impunctate, front feebly concave, with scattering very short hairs which are scarcely more dense than those on the thorax.

Type: No. 16841 U. S. N. M.

About one hundred and thirty specimens from dry woody fungus were taken at Alhajuela, Canal Zone, Panama, in April, 1911, by Mr. August Busck, among a numerous colony of *Arrhenoplita cioides*.

Differs from the Texan species (supposed to be *peninsularis* Horn) and from the West Indian species (supposed to be *cornutus* Arrow) by its shorter, more robust form, and shining elytra, and by the almost total absence of the frontal pilosity of the female.

Eutomus n. sp.

Specimens of a fourth species of this genus have just been donated to the National Museum by Mr. W. S. Blatchley who collected them at Dunedin, Florida, in January, 1913. Mr. Chas. Dury informs the writer that he expects soon to publish the description of this species in Entomological News. It is much smaller than the three species of this genus above mentioned, being about the size of *Rh. flabellicornis*.

INDEX TO VOLUME XV.

LIST OF ERRATA IN VOLUME XV.

Page 74, line 11 from top, for "Burmuda" read "Bermuda."
Page 74, line 17 from top, for "catoirei" read "catoirii."
Page 74, line 2 from bottom, for "sapadillos" read "sapodillas."
Page 98, line 10 from top, for "Snythesiostrebla" read "Synthesiostrebla."
Page 120, line 18 from bottom, for "brevicornis" read "brevicomis."
Page 120, line 10 from bottom, for "brevicornis" read "brevicomis."
Page 168, line 5 from top, for "Gonzales" read "Gonzalez."
Page 168, line 24 from top, omit "the"; after "eggs" insert "presumably of Dermatobia."
Page 191, line 14 from bottom, for "Arrkenoplita" read "Arrhenoplita."

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